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[OFFICIAL NOTICE.]

AMERICAN GAS LIGHT ASSOCIATION,
PRESIDENT'S OFFICE, HARTFORD, CONN., 31st August, 1891.

To the members of the Association:

Gentlemen—Owing to the continued illness of Mr. C. J. R. Humphreys, Secretary and Treasurer of this Association, and consequent inability to perform the duties of those offices, I have this day appointed Mr. A. C. Humphreys, of Philadelphia, Pa., as acting Secretary and Treasurer of the Association, to serve until the close of the annual meeting in October next, or until his successor is chosen.

J. P. HARBISON, President.

BRIEFLY TOLD.

THE CONTINUED ILLNESS OF SECRETARY HUMPHREYS.—It has been quite generally known for the past few months that Mr. C. J. R. Humphreys, Secretary of the American Gas Light Association, has not enjoyed that measure of health which enables men of business to direct their affairs with the closeness of application that the rush and bustle of this hurrying age demands of its toilers. Some time before the Western Association meeting the Secretary complained of a weariness that had been foreign to him, and those acquainted with his labors at Lawrence, Mass., were not at a loss to trace this feeling to a likely source. Certain business matters of a pressing nature exacted much thought and the expenditure of much energy, but his usual methods of dissection and action soon accomplished the objects striven for. With their accomplishment, he found that he had over-estimated his strength and then came the days of penalty which nature exacts from those who do not pay timely heed to her initial warnings. One thing about Mr. Humphreys is that he seemed ever too willing to pay undue heed to the carrying out of details, and as one mind and force cannot continue to do the work of many in the end one must trust to others for a portion of the field work, the orders for its performance having been issued. In short, Mr. Humphreys is a victim of overwork, and while his condition is not such as to seriously alarm his relatives and friends, his physicians insist on his perfect freedom from business cares in order that his recovery may be accelerated and caused to be permanent. This will explain the official notice that appears in this number respecting the action taken by the President of the American Association in appointing Mr. A. C. Humphreys as Acting Secretary, to carry on the preliminaries connected with the coming meeting, in so far as these are related to the Secretary's post—which the members know are many and varied. President Harbison's appointment is an evidence of his tact, and the Secretary *pro tem.* ought to have at once the hearty assurance of every member that nothing in which they can be of assistance to him will be left undone to aid him in carrying into complete effect the duties of the office to which he was so hurriedly called.

AN IRISH GAS MANAGER'S VIEW OF MUNICIPAL CONTROL.—In this issue we reproduce a paper (read by Mr. David Williamson, Engineer to the Ballybay gas works) entitled "Should the Supply of Gas be in the Hands of Companies or Corporations?" which was presented by the author at the meeting of the North of Ireland Association of Gas Managers. The paper is interesting, in that it gives us an insight, slight

though it be, to the workings of the gas industry in a country about which we now hear very little in respect to matters gaseous, although time was when Mr. Denny Lane, of the Cork Company, was one of the writers on gas topics whose words were always welcomed the gas world over, and studied with profit. However, our concern just now is with the arguments put forward by Mr. Williamson with respect to his affirmative argument that corporations (municipal authorities) should control the gas supply instead of companies. Following the rule usually observed by Irishmen in argument—which, broadly stated, may be said to be to strain the facts a trifle in your own favor, trusting to the poor memory of your audience to detect the stretching—Mr. Williamson puts before us certain groupings in proof of the not narrow deduction that the corporation side of the case has it by a large margin. Perhaps the "group" of Belfast (corporation) and Dublin (company) will best suffice to show that his premises are not faultless. Belfast to-day is probably the greatest example in Ireland—and it might well be taken as an example in similar respects (outside of five large cities in England)—of a great industrial growth. A score of years ago Belfast was a comparatively small city, even though it was a busy place, as the center of the linen industry; but with the revolution in the methods of ship building came Belfast's chance for improvement. On the other hand, "Dear, dirty Dublin" not only failed to go ahead in that time, but went back; so that now we suppose the cities are about even as to population, and are not to be mentioned in the same breath from an industrial trade wind. Facts, however, are what are wanted. According to the returns from which Mr. Williamson quoted it may also be found that the consumption per meter in Belfast is 40 per cent. greater than is the case in Dublin, that gas coals are 11 per cent. cheaper, and that coke is worth $3.12 per chaldron in Belfast, whereas, it is a drug in the Dublin market at $2.50. Again, the main mileage in Dublin is 37 per cent. greater than in Belfast, a fair proportion of which main in Dublin carries nothing almost but public lamps, and those are so sparsely spread in the latter place that Dublin maintains 6,109 lamps to the 5,556 of Belfast—and Belfast is, as to area, as compact again as is Dublin. So we submit that Mr. Williamson's argument is equal to that of the amateurs at Johns Hopkins University on this side of the water, when they seek to show that municipalities ought to control gas supply. The discussion on the Williamson paper is notable chiefly for the unanimity of opinion which those in charge of corporation works favored municipal control, and for the singleness of argument, *per contra*, on the part of those who operate companies' works. Another feature of the discussion was the elegance with which Mr. Valon, of Ramsgate, straddled the question without seemingly straining a muscle.

NOTES.—The special election at Little Falls (N. Y.) to decide whether the city shall hereafter be lighted by electricity was postponed until the 11th inst.——The Oakview (Pa.) electric light plant is in the hands of the local constable. Cause, $400 due to the employees.

The Market for Gas Securities.

There was nothing out of the common in the market for city gas shares during the week, Consolidated showing no change. The opening price to-day (Friday) was 96½ bid, offered at 98, or identically the same figures recorded in our last. The situation in this city, in respect to all local gas securities, may be summed up as dull and strong. In Brooklyn gas shares the feeling is considerably improved, as a rule, Nassau and Fulton-Municipal especially showing well. For the former 134 was freely bid, but holders were disposed to consider 138 as under the market value. Fulton-Municipal was bid for at 115, but it is not likely that anything less than 120 would effect a transfer. Citizens was about as before. The shareholders in the Union Gas Light Company, of East New York, have been summoned to attend a meeting, to be held at the Company's office, corner of Ashford and Atlantic avenues, Brooklyn, at 2 P.M. of October 6th, for the purpose of considering an agreement, entered into on August 27th by the Directors, to consolidate their business with that of the Citizens Company. The Kings County Illuminating Company, which is really a branch of the Citizens Company, is about ready to supply gas in the Bath and Bensonhurst districts. A good street lighting contract is owned by the Company.

In out of town shares Laclede gas is reported at 18 to 18½, Chicago gas is at 50½, and Bay State gas is at 50 to 60. Cleveland gas, despite the 60 cent ordinance, has not yet come upon the market, and Cincinnati gas is active and in demand. San Francisco shares show no change. The general market is strong, which is not to be wondered at from the send-out figures received by us from 67 points in the country, a summary of which will appear in our next issue.

How to Increase Dividends.

By "AN OCCASIONAL CONTRIBUTOR."

Having repeatedly made the statement to my neighbors that illuminating gas used as fuel for cooking was cheaper at $2.50 per 1,000 cubic feet than wood at $3 per cord, which assertion was based upon experience obtained in my own household in an old Virginia town, many years ago, we resolved to see how much it really would cost now, with improved stoves, to use good illuminating gas for fuel. The term *we* is used advisedly in this case, for it was my wife—who is quite a "gas man"—that volunteered to assist me in this search for knowledge in domestic economy, without which assistance the following facts could not have been obtained, at least not by the writer, as the reader may admit without much argument. We purchased a good gas stove, which had an oven large enough to hold a good sized turkey, and connected it independent of the house service pipe. The gas, before reaching the stove, had to pass through an ordinary 5-light consumer's dry meter, and a test meter such as is used in photometrical work. Thermometers and pressure gauges were attached at suitable points, and the results of our work, which extended over a period of one whole summer, were carefully recorded. It was the intention of the writer to prepare these results in pamphlet form, and present them to the patrons of the company when they came to pay their bills; and, as we were pretty well known, thus induce our friends and neighbors to enjoy the comforts and share in the saving afforded by gaseous fuel, and at the same time increase the legitimate business of my employers, the gas company.

Circumstances, however, combined to frustrate the original intention. The pamphlet was never written, many of the items were mislaid or lost in the general breaking up of a home and moving far away; but what was left is now presented to the readers of the JOURNAL, in the hope that it may prove interesting, and perhaps of use as well. The tests were made during the spring and summer of 1890, and the table may be regarded as strictly reliable, as the work of measuring the gas was done with great care and good apparatus. The average illuminating power of the gas used was 20 candles, and the price to the public was $1.25 per 1,000 cubic feet; which is .125, or one-eighth of one cent per cubic foot. (See table on following page.)

It will be seen that to cook single dishes costs relatively more for fuel than when a whole dinner was cooked; but what could be cheaper, for instance, than about three-quarters of one cent for fuel to cook a gallon of tea or coffee, or a little over one quarter of a cent to cook a quart of chocolate? As a rule, people do not realize how very cheap a fuel good illuminating gas actually is. Customers should, however, be strongly impressed with the fact that *when the gas is not used it should not be turned on;* for if it is it will of course continue to be registered by the meter, and thus unnecessarily increase the gas bills--an avoidable and clear waste to the consumer, for which he alone is to blame.

The question has been asked me, "Is not food cooked by gas affected by the smell of it?" It seems hardly necessary to answer this; and yet, when it is asked seriously, the gas man must be patient and explain that a gas fire will no more affect food that way, than fire produced by burning coal or wood. Tables like the following, but of a more extended range, could easily be prepared by every gas company, fitting the wants of same to prevailing local conditions; and if done and the information spread as it ought to be, it would unquestionably largely increase the sales of gas, and thus not only increase the revenue of the gas company in a desirable direction, but make it possible to sell gas at a lower price. This matter has been brought out many times before, and yet the merits of gas for fuel purposes are little known comparatively, among the mass of the people. This is true especially of all large cities. Gas fuel for cooking purposes is not only the cheapest, but the cleanliest and safest fuel which can be used. The reader will say—"We know all that." No doubt of it; but spread the knowledge among the people and increase your business and revenue. At the fourth annual meeting of the American Gas Light Association Mr. Starr, of Richmond, Ind., read a most interesting paper on the use of gas for cooking. This was 15 years ago, and Mr. Starr then stated that gas at $3.60 per thousand was cheaper fuel than wood at $7 per cord. He also said 90 per cent. of the dwellings in his city were fitted up with gas stoves. Think of it ye, representatives of the wise and cultured East: Ninety per cent. of all the dwellings in this little city of the "wild and wooley West" thus fitted up 15 years ago. If 30 *per cent.* of the dwellings of New York city were fitted up that way, thus enabling its inhabitants to use this cheapest and most convenient of all fuels, the gas companies could not—with the existing plants—supply one-half of the gas which would be required—*no, not one half*: Think of *that* my Metropolitan friends; here is a good field for profitable

	Article Cooked.	Hours and Minutes the Gas was Burning.	Gas Pressure at Inlet of Stove.	Temp. of Gas.	Cubic Feet of Gas Used.	Cost of Gas at $1.25 per 1,000.
1.	A dinner consisting of 9½ lbs. turkey, 10¼ lbs. ham, with a head of cabbage, 1 quart cranberries, a large cocoanut pie, 2 quarts potatoes and 2 quarts coffee	3 h. 30 m.	12-10ths	70°	100.8	12.6 cents.
2.	A 17 lb. plumb pudding	5 h. 20 m.	9-10ths	77°	68.5	8.5 "
3.	Parching 2 lbs. coffee (lost in parching, 2 oz.)	39 m.	14-10ths	68°	23.1	2.88 "
4.	Cookies, weight 2 lbs. when baked	45 m.	14-10ths	78°	26.2	3.28 "
5.	Pork roast (4 lbs.), with sweet potatoes	1 h. 35 m.	11-10ths	75°	46.0	5.75 "
6.	Large apple pie	50 m.	11 10ths	75°	24.9	3.11 "
7.	Tea, 1 gallon	36 m.	9 10ths	76°	5.9	0.73 "
8.	A half ham, 6 lbs	3 h. 00 m.	17-10ths	75°	37.5	4.68 "
9.	One gallon of vegetable soup	3 h. 10 m.	14-10ths	75°	40 0	5.00 "
10.	One quart of chocolate	20 m.	9-10ths	75°	2.5	.31 "
11.	Three quarts of coffee	48 m.	9-10ths	75°	6.8	.85 "
12.	Biscuits, 1¾ lbs	40 m.	11-10ths	76°	23.0	2.87 "

activity on your part. Can you not see it? But it is so, and as some one has remarked, "facts are stubborn things." It is a fact that if a knowledge of the economy of gas as fuel for cooking purposes was spread among the masses, as it deserves to be, in all large cities, but especially in New York city, that the works now in operation would have to run as full in summer as in winter; that they could not with their present capacities supply one-half the demand for gas; and that the value of gas stocks of every kind would become largely increased thereby.

That is a point for directors and stockholders of gas companies to think about, as it means dividends to them if acted upon; and why should it not be? Instead of employing a lot of canvassers to take consumers from each other, and fitting up stores for nothing, by which certainly nothing is made, let the said canvassers be made truly useful by demonstrating to a willing people the right way to use gas, and the economy and comfort of it if rightly used. Then there would soon be a demand for flats fitted up with gas ranges, where now one can scarcely find a suitable pipe to which a small gas stove may be attached in any house. Show the truth. Show up the cheapness of gas for the purposes named, and the people will soon demand—and if they demand, get—gas stoves, gas ranges and pipes of suitable dimensions to enable them to cook, wash and iron by the aid of gas fires, and then the engineers will have to do some "hustling" to increase the producing power of these works—all of them; and once more the holder of gas stocks shall be happy. But the companies should not always wait for some one else to do that which it would pay *them* to do.

Unaccounted-for Gas.

[A paper read by Mr. D. Robertson before the North British Association of Gas Managers.]

The term "unaccounted-for gas" is, of course, understood to mean that proportion of the annual manufacture which fails to give any indication of its existence through the medium of consumers' meters and other legitimate channels whereby the consumption of gas is recorded. While there cannot be any doubt in the mind of a gas manager at the end of his financial year as to the percentage unaccounted for, there may still be serious doubts as to where and how it is all getting lost; and it should be the aim of every manager of a gas works, whether large or small, to leave nothing undone which could be expected to reduce this percentage still further. From statistics supplied for the year 1875 by the West of Scotland Association of Gas Managers, I find that the average return for leakage was 17.43 per cent.; and last year the North British Association returns show the average leakage to be 12.78 per cent.—a reduction of 4.65 per cent. in 15 years, which clearly indicates that Scottish gas managers have during that time been fully alive to the importance of this branch of their business.

I am sorry to say that at Dunoon our percentage of gas unaccounted for is expressed by two figures—being 13 per cent. on our make; and it has taken a great deal of work to reduce it to even that figure, as our district is somewhat widely spread, with 17 miles of main pipes to supply 13,000,000 cubic feet of gas per annum. One cause of our high percentage of leakage is that we have to provide distributing plant capable of supplying a population of 20,000 persons, three-fourths of whom reside in the district only three months out of every year; so that if our consumption was at all in proportion to the capacity of our mains, we should probably be in the happy position of some of our friends whose leakage is less than 5 per cent. I understand that our leakage 20 years ago was 33 per cent.; and 6 years ago, when I took charge of the works, it was 26 per cent.—a condition of matters, which you will readily admit, is not conducive to paying high dividends.

For the past 6 years we have been using every means in our power to reduce the leakage to respectable proportions; and having managed to come within "measurable distance" of the average, we feel that ours is not altogether a hopeless case. Our mode of operation was, in the first place, to pierce the line of main in districts where we had reason to think gas was being lost; and, by this procedure, a great number of bad leaks were discovered and stopped. We have since, at different times, examined all the mains in a similar manner; and although it may cost more in wages for a month or two, at the end of the year it shows considerably on the right side of the balance sheet. We also instituted a system of rewarding parties who call with information of escapes on the roadway; and we have found this plan to work admirably, as many a man or boy will feel a stronger inclination to walk perhaps half a mile to lodge the information, if he knows there is a shilling at the end of the journey, than if there is nothing. Besides, if any information is worth paying for, I consider it is that which, although costing only so small a sum, enables us to prevent waste to the extent of pounds in value. Scavengers, policemen, and postmen, who are constantly on the road, are our best detectors of escapes.

Mains and services we have found to be the chief causes of leakage; and attention directed to this part of the plant will not fail to yield beneficial results. I may say that I have found Pitkin and Niblett's coal gas detector of great service when searching for leaks, especially in places where it would be unsafe to use a light. But although mains and services are the chief outlets for unaccounted-for gas, they are not the only ones; for if consumers' meters are not regularly watered and overhauled, things are not as they ought to be. For instance, an old wet meter watered three times a year might be failing to register at least one-fourth of the gas passing through it. It might indicate correctly for three months after being watered; but in the remaining month it registers nothing. The inspector goes his round, finds a certain quantity of gas registered, and considers it all right. The meter is then watered, and goes on for another three months, only to stop again at the expiration of that period. This might continue for years, and nobody be any the wiser, unless the inspector is of an inquiring turn of mind, and has the meter taken out and a new one put in its place, to pay for its own cost in a year or two.

I consider it to be mistaken policy to keep down expenditure by retaining in the place a lot of old meters that should be occupied by new and efficient ones. Anyone who has ever performed the duties of meter inspector can understand the feelings of a painstaking officer when he discovers a meter passing gas without registering it; and, on informing the consumer that his account will have to be charged on the basis of the same quarter in the previous year, he is usually met with a grumble, and the statement that "much less gas has been used this quarter." Some months ago a case occurred in my own experienee, in which a lady complained very much of the amount of her quarter's account. She said she was sure the meter was going fast, as she had not burned all the gas for which she was charged. She wanted another meter; and to satisfy her, and also myself, I had the one she was using tested, when I found it registered 20 per cent. *slow*. It is almost unnecessary to say that I changed the meter. The lady was pleased, and so was I, but for different reasons. Of course, this is not an isolated case, for I have no doubt many of you could bring to recollection similar incidents in your own experience; but it certainly shows the wisdom of having a systematic testing of meters.

Service connections to mains are another source of vexation to a gas manager who wants to get his leakage down to as near zero as possible. I have on several occasions discovered connections where the main had been bored a little too wide for the tap. The form of tapping had been gone through, and the malleable tube not screwed in, but slipped in, and carefully rubbed with white lead to prevent it leaking. This was

effectual probably for the first week, after which the pipe began silently to contribute its quota to the percentage of unaccounted-for gas. This kind of work I believe to be not owing to careless workmen, but to incompetent ones. Sometimes a local gas fitter who is not conversant with this kind of work, and who perhaps has not suitable tools with which to do it, finding he has made a bad job, buries it under ground as quickly as he can. But more often the mischief is caused by the individual known by the appellation of the "handy man" who is employed in many small works. I would advise managers of works like those of which I have charge to steer clear of the "handy man" for main and service laying, and rather employ one who has served an apprenticeship to a trade, such as a gas fitter or a blacksmith, and who would be willing to put his hand to rougher work when necessary. I have found this to answer well in my case; and I am of opinion that it is the best plan. I would also suggest that, when a good man is obtained, he should be left a great deal to himself as to the manner in which he does his work. No doubt many of us are very particular and painstaking, more especially when we are supervising another man's work; but it is a mistake to be too exacting, as it is apt to sour a good workman.

Street lamps are, almost without exception, a certain source of loss in every town. This is owing, in a measure, to a separate service pipe being required for each lamp (thus multiplying the number of connections to the main), but also, in a far greater degree, to the fact that much more gas is, as a rule, consumed than is allowed for when an annual charge per lamp is made. In our district, for some years previous to 1886, the charge per lamp for the season from the middle of August till the end of April, allowing six nights out of every month when the moon was supposed to be shining, was 13s., using a No. 2 Bray's burner, from dusk till 11 P.M. But in 1886 the average meter system was adopted—the other conditions of lighting remaining the same as formerly; and at the end of the season we found that instead of 13s., the amount consumed per lamp was 18s. 10d., subject to 7½ per cent. discount. This was equal to a reduction of 2 per cent. in our leakage account, and an increase in revenue of 5s. 10d. per lamp, although the lamplighters were under much stricter supervision, owing to the lamp meters having been fixed.

Condensation is supposed by some to account for a large proportion of the loss; but I am inclined to believe that it affects the gas more adversely in quality than in quantity. My reason for this belief is that in one part of our district we have a stretch of 3-inch main pipe extending three miles along the sea shore; and our total revenue from this main amounts to about £70 per annum, or 280,000 cubic feet of gas sold. Taking the percentage of leakage on this road as the average of the whole district would give 36,400 cubic feet; and adding it to the gas sold would give a total of 316,400 cubic feet. Allowing 1 per cent. of this for loss by condensation yields 3,164 feet; and supposing the specific gravity of the gas lost to be .600, we should be able to pump out of the drips 144 lbs. of liquefied hydrocarbons, or equal to about 14 gallons of pure liquor. We do not get so much pure liquor as this out of the 22 drips in the road in question, in the course of a year. Therefore, I think that I am justified in assuming that the loss by condensation is considerably less than 1 per cent.

It has been said that dividends are made in the retort house, but may be lost in the street mains; and this remark applies with double force to small gas works supplying widely-extended districts, where the gas, getting into long stretches of idle mains, has really nothing to do but to try and get out by the nearest leaky joint. Our duty is to keep it under control until it has reported itself at the consumer's meter, from which it passes into the service of another master, who, under the present system; may use or abuse it as he pleases. Our responsibility practically ends on our delivering gas into the consumer's meter; but we ought, if possible, to keep a watchful eye on its progress from the meter to the point of combustion, and endeavor, as far as lies in our power, to educate the consumer into the most economical and efficient way of using gas for lighting, cooking, and heating. If we do this efficiently, we shall have our reward in a larger consumption per customer, and thus open one of the readiest channels to a decrease in unaccounted-for gas, by increasing our sale of gas per mile of main.

Should the Supply of Gas be in the Hands of Companies or Corporations?

[A paper read by Mr. D. Williamson before the North of Ireland Association of Gas Managers.]

Mr. President and Gentlemen—The subject I have chosen is one which I think is worthy the consideration of every gas manufacturer and consumer, more especially if it can be made clear, by its intelligent discussion, that the public can be supplied with gas more economically by the service being in the hands of one or the other body. I think, therefore, that the question comes naturally within the scope of an Association like ours; and in a meeting such as this, at which representatives of both classes of proprietors are present, it can be discussed from the two standpoints. Seeing that, as gas managers, the interests of the consumers are ours quite as much as those of the proprietors, I believe the discussion will be an impartial one. I may say that I have never heard the subject debated; and for this reason I have attempted to bring my own ideas on the matter before you now, though in a rough and very imperfect manner; trusting that a thoroughly exhaustive investigation may be the result.

At the outset, I must say that my own views on the question are very decided. I have thought a great deal about it, and am fully convinced that it would be to the advantage of consumers generally to have the gas supply under the control of the existing local authorities, or, perhaps still better, the county boards. I am a believer in the minimum of capital with a maximum of shareholders; for I hold that the greater the number of shareholders, the greater the sympathy in any concern. Now, I need not say that this would be fully realized if the gas works were transferred from companies to local or county boards. I do not wish it to be understood that I find fault with the gas companies generally, for I do not. I believe that they have served their customers fairly well; at the same time, I think that local or county boards could do it better.

It is said that there are £130,000,000 sterling sunk in the gas works of England, Wales, Scotland, and Ireland. It is computed that £30,000,000 of this capital is under the control of corporations; leaving the remaining £100,000,000 in the hands of companies. Now, if we look over the returns given in the "Gas and Water Companies' Directory," we find that the dividends paid by gas companies to their shareholders are: In England, from 2½ to 17 per cent.; in Wales, from 2½ to 12 per cent.; in Scotland, from 2½ to 15 per cent.; and in Ireland, from 2½ to 10½ per cent. It would seem from these figures that, of British Gas Companies, those in Ireland yield the smallest return to their shareholders; and I think I shall be pretty near the mark if I assume the average dividend paid in that country to gas shareholders to be 6 per cent.

It is well known that local boards can borrow money from the Government at a much lower rate than even 5 per cent., which rate covers not merely the interest, but the repayment of the principal in a certain number of years. If we take it at 5 per cent., £100,000,000 at 6 per cent. would be £6,000,000. Now, supposing all these works were bought by the local or county boards at this full amount of capital of £100,000,000, borrowed thus, and repayable in a certain number of years at 5 per cent., there would be a net saving of £1,000,000, which could go towards reducing the price of gas. There would also be the advantage that at the end of the given period the works would be the property of the boards, free of annual charge.

To explain more fully my meaning, I will take a small works in Ireland with a paid-up capital of £2,000, at 6 per cent. dividend, which would be £120. Supposing this was purchased by the local or county board at the full amount of £2,000, repayable at 5 per cent., there would be a net gain of £20 per annum for the stipulated number of years over which the repayments of the loan would extend, and the additional saving of the £100 a year besides. But I shall now content myself with looking at the immediate saving of £20. There would then be no need for the services of a secretary or collector, for this duty could be transferred to the clerk and collector of the board; and I should estimate a net gain of £15 on this account. Directors' fees would also be saved—say, £15; which would make a total of £50 at least in favor of the transfer. I take the receipts for gas from such works at £500 per annum (there may be some more, but I am sure there are some less). This would show a saving equal to about 10 per cent. of the gas receipts; and if the price were 6s. 8d. per 1,000 cubic feet, it would allow a net reduction of at least 8d.

One great advantage arising from the transfer would be that all the ratepayers in the place, either directly or indirectly, would be shareholders in the concern; and this would have a tendency to increase the consumption of gas. This is much wanted in all our small towns; as, of course, the limited number of the consumers, and the small extent to which they use gas, prevent it being supplied at a cheap rate, especially in inland places, where carriage is such a heavy item in the expenditure. Another advantage would be that there would be fewer, if indeed there were any, of those unpleasant disputes with which I am sure that some of you are acquainted. Under the present conditions it too often happens that town commissioners complain that the gas company charge far too high a price for the gas supplied to the public lamps; and they demand a reduction. Sometimes they go so far as to name their own

price; thus intimating that they consider they know the directors' business better than they do themselves—a proceeding which generally ends in a rupture, and the gas being cut off from the public lamps and oil substituted. Truly a miserable change! I have known this to be done for at least three seasons, to the great displeasure of the ratepayers. But, of course, they then returned to gas. I need not say that this would not occur if the change I advocate took place.

The next consideration is how this transfer of property is to be accomplished. This is a difficulty in connection with the subject which I confess my inability to solve; but I will give you my idea, and leave it to more competent authorities to complete. Perhaps some will say that the law as it now exists is quite sufficient. I think it is not, and for this reason: It seems to me to be a piece of very rough and slow legal machinery, which is compulsory on one side only; for, if I mistake not, while it compels gas companies to sell, it does not not compel local boards to buy. What I think is required is a short Bill, to be called, say, the "Gas Companies' Compulsory Transfer Bill;" or a clause for the purpose might be inserted in a County Council Bill.

Then with reference to the price that should be paid to the companies, I would say: Give them not more than 20s., perhaps less, for every £1 of paid-up capital that is sunk in the concern. Someone may remark that this would be treating the gas shareholders unfairly; as they are receiving a good dividend for their money. My reply is: They are not entitled to more than a fair return for their money; and if they receive a large dividend they should not do so, for the company ought rather to reduce the price of gas and give their customers encouragement to extend its use for other purposes than illumination—such as for heating, cooking, etc.

There is a further benefit which I think would arise if the county boards had the gas works transferred to them, and that is that the boards could purchase, under one contract, all the coal, etc., required for the different works under their control. Thus the small works would be supplied with as good material as the large ones, and at the same rate. This, I think, would be an undisputed benefit, especially to small places.

It may be urged that I am not justified in asking the farmers of a country to be responsible in any way for a guarantee for something that is only in the interests of those who reside in towns. My reply is: "What is sauce for the goose is sauce for the gander." The farmers are no more entitled to ask the ratepayers of a town to be responsible for a guarantee for the repayment of their holdings. Therefore, the course I propose would be asking nothing more from country ratepayers than they already receive from town ratepayers; and I think there is nothing unfair in this. But some may say that only consumers of gas would be benefited by the change. I reply that most certainly consumers of gas would be benefited by it; but I contend that every ratepayer would be benefited as well. They would do so in two ways. First of all the streets would be much better lighted at a lower cost for gas; secondly, they would have the advantage of the works becoming their property, free of charge, at the end of the period for repayment; and then the gas could be supplied at a cheaper rate.

I have endeavored, in my own rough and imperfect manner, to show you that gas can be sold at a lower price, by at least 3d. to 8d. per 1,000 cubic feet, by the change of the control of the different works from companies to local or county authorities. I hope this will soon be an accomplished fact, for I believe that gas should be supplied at the lowest possible price consistent with the keeping of the works in proper repair. In fact, I would say that it should be sold like any other commodity that is dependent on a fluctuating market for its raw material. I mean that if coal is bought at a low price, the charge for gas should be correspondingly low; if the price of coal rises, that of gas should be raised accordingly for the time. The price should always be regulated in proportion to the cost of coal, labor, etc.; and I have no hesitation in saying that local or county boards could do this with much less difficulty than a company would experience. I need not say that it is a pleasure to give notice of a reduction; but the very reverse is the case when an increase has to be intimated.

These are my views in regard to the proper parties to have the control of the gas supply of the country; and if I have said anything that will arouse an expression of opinion, adverse or otherwise, I shall be pleased to hear it, either in this meeting or anywhere else. I really think gas consumers all over the country should consider this matter, as they would all be benefited by the change I propose. You are all aware that it is in the hands of the ratepayers to make a general transfer of gas works to local authorities an accomplished fact, as it is they who would be benefited thereby.

Having the utmost faith in the proposal I have made, I hope we shall soon see it carried out. If this were done, it would have a tendency to equalize the price of gas all over the country. If any of you go to the trouble of looking into the statistics bearing upon the matter, you will be much surprised to see the great difference in the price charged for gas in towns which are about equal in size and position. I will give you a very few places I have grouped together in this way, and you will observe the disparity. The works in these towns all belong to companies, except two (marked with a *), which are owned by private parties:

Town.	Tons Coal Used.	Price Charged.	Difference.
Omagh	—	5s.	1s. 3d.
Tipperary	—	6s. 3d.	
Banbridge	800	3s. 9d. to 4s. 7d.	3s. 9d. to 2s. 11d.
*Mullingar	800	7s. 6d.	
Monaghan	550	5s. 10d.	0s. 8d.
*Enniskillen	800	6s. 6d.	
Donaghadee	115	5s.	2s. 11d.
Ballyshannon	120	7s. 11d.	
Galway	1,600	4s. 9d.	0s. 8d.
Sligo	1,700	5s. 5d.	

Now, a glance at the map of Ireland will show that each two of the places I have grouped are pretty nearly similar in size and position, and yet there is a great difference in the price charged for gas, especially in the cases of Banbridge and Mullingar, and Donaghadee and Ballyshannon. I think that such a difference should not exist; and I believe that if the supply were in the hands of the local or county authorities of those towns, it would not exist. Again, in looking over the Directory already alluded to, I was surprised to see that so few gas works in Ireland are under the control of local boards. I think there are only about seven or eight in the whole of Ireland in the hands of these bodies. So I have taken a few of them and compared their prices:

Town.	Proprietor.	Tons Coal Used.	Price Charged.	Difference.
Bandon	Commissioners	700..	5s.	1s. 3d.
Carlow	Company	700..	6s. 3d.	
Coleraine	Commissioners	1,200..	4s. 2d.	10d.
Queenstown	Company	1,530..	5s.	
Newtownards	Commissioners	943..	4s. 2d. to 4s. 7d.	1s. 3d. to 10d.
New Ross	Company	900..	5s. 5d.	
Youghal	Commissioners	705..	5s.	2s. 6d.
Ennis	Company	760..	7s. 6d.	
Newry	Commissioners	3,115..	4s. 2d.	6d.
Waterford	Company	4,278..	4s. 8d.*	
Belfast	Corporation	91,926..	2s. 9d.†	9d. to 1s. 3d.
Dublin	Company	117,614..	3s. 6d. to 4s. 0d.	

* Net. † Less discounts up to 20 per cent.

From these figures, I think you will see that what I have endeavored to prove is a reality, so far as regards the price charged for gas in those places which are under the control of the local authorities. When compared with places of about the same size and position under the control of companies, I am sure you will agree with me that, if Belfast can supply gas at so low a price, that of Dublin should surely not be so high, especially since the Dublin Company, according to the figures given, carbonize 25,688 tons of coal more than the Belfast Corporation. But I think this difference is caused by the change of ownership in Belfast from a Company to the Corporation. I consider that the ratepayers are very much indebted to the Corporation for their forethought in the purchase of the gas works; and that Mr. Stelfox and his subordinates are worthy of the thanks of all the gas consumers in the city for their economical management of the gas works, when they can be supplied with gas at so low a rate as that which I have given. Of course, there is only one Belfast in Ireland. But I believe if the principle adopted there were carried out all over the country, it would result in a benefit to the gas consumers generally of from 3d. to 8d. per 1,000 cubic feet. So that I think consumers should look to this for their own advantage; for they would certainly effect an immediate saving, as I have said, of 10 per cent. or more on their gas accounts.

I have endeavored to place before you, in a simple way, my views on this question, supported by facts and figures which I believe to be indisputable, and I shall be pleased to hear you all express your opinions on the matter. I know that you will not all agree with me in my conclusions, but a healthy discussion will do good. For my own part, I have the greatest faith in the benefit that would result if my ideas concerning the gas supply of Ireland were to become accomplished facts.

Discussion.

The President said Mr. Williamson had placed the Association under a debt of gratitude by preparing and reading so admirable a paper. The subject treated was one that he (the President) had never heard dealt with before. The speaker had put his views before the members in an able manner; and he was sure the subject would give rise to a useful and profitable discussion.

Mr. Featherstone suggested that the views of Mr. Valon, from his position as President of the Gas Institute, would prove interesting to the meeting.

The President said the members would be delighted to hear Mr. Valon, if he would be good enough to address them.

Mr. Valon said he had not expected that he would be asked to speak at the meeting; but he would be glad of the opportunity of making a few remarks upon the subject dealt with in Mr. Williamson's paper. However, in order to be in a better position to do so, he would like to postpone his observations till those who desired to discuss the question had placed their views before the members.

Mr. Salmon expressed his admiration of the manner in which Mr. Williamson had treated his subject; but said he could not agree with him in the conclusions at which he had arrived. In his opinion, consumers were far safer in the hands of a company carrying on their business under the watchful care and supervision of town commissioners or a corporation, than they were when the gas works were managed by these authorities. He thought the consumers were much more fairly treated by a company than by a corporation, because, in the case of the latter, there arose the question of the division of the spoils; and the paraffine man claimed his right to get as big a share of the profits as any one else. Another argument in favor of his views was that, if the gas company were not in any way dependent for privileges upon the town or city board, it would be found that they would extend their system considerably beyond the limit that would be observed if the lighting were in the hands of the local authority. This was his experience of both companies and corporations; and he had come to the conclusion that, as far as the interest of the consumers, at all events, was concerned, they were much safer and better off where the works were in the hands of a company than where they were under the control of a corporation. One great objection he had to gas works managed by corporations was that these bodies changed their minds so very often with regard to the management. In fact, changes in the control of the works seemed to be their principal hobby. The man in charge was sent about his business, and another was brought in, with the result that, in the great majority of instances, the new man discovered that everything had been going wrong under his predecessor and changes were the order of the day. In his (Mr. Salmon's) opinion, what was required in a great many cases was that a travelling engineer should be appointed to look after the plant—a course which he believed would be attended with most satisfactory results. These and many other things that had come under his observation from time to time led him to the conclusion that a company gave a better and a cheaper light than a corporation, and that in every way the interests of the consumer were more satisfactorily conserved and looked after by a company than they would be by a local authority, whether town commissioners or a corporation.

The Secretary remarked that the Association were deeply indebted to Mr. Williamson for his paper. This was a subject which was bound to raise discussion, and upon which it could hardly be expected that they would all be of one mind. One thing, however, must be quite clear to every one, and that was that Mr. Williamson had certainly the courage of his convictions. He had given them a great many figures in support of his arguments; and he (Mr. Whimster) had just been considering them. They had all heard it said that figures could be made to prove anything, and Mr. Williamson had made very good use of the figures he had cited to establish the position he had taken up. Figures, however, could be quoted that would very considerably shake the arguments of Mr. Williamson. He (Mr. Whimster) could point to one instance of an inland town where the gas works were in the hands of a company, and where the gas was sold considerably cheaper than in a seaport town where the works were under the control of a corporation. He could not agree with Mr. Williamson in what appeared to be his view of the question—viz., that the gas supply being in the hands of corporations was the *El Dorado*—the land of promise of the future. Corporations were fluctuating bodies, composed of men who were elected to a coveted position; and when these men reached the goal of their desires, and found themselves representing the public on these bodies, they felt bound to justify the confidence that had been reposed in them by the votes of their fellow-citizens. It was their object to gain popularity, and there were different ways in which this was accomplished. The two principal, and perhaps the two easiest ways of justifying this confidence, of increasing their popularity, and of raising themselves in the public esteem, were, first of all, the reduction of taxation; and, secondly, the reduction of the price of gas. Under such circumstances as these, whenever a corporation had a surplus, the members dealt with it in one of two different ways. They took this surplus away from the original purpose for which it was intended, and devoted it either to the reduction of the general taxation, or to the lowering of the price of gas to such an extent that, as a necessary consequence, the works would have to be starved in order to be in a position to pay their way at all. Under such circumstances, and with such a course of action, it was not hard to see that the result was a large expenditure, the capital account swollen to a terrible extent, and the concern burdened for the future. In the case of a company, the proprietors had a direct pecuniary interest in the undertaking, which the members of a corporation, either individually or collectively, did not possess. Any surplus which might be the result of the working of a company was conserved for their future needs; and this surplus eventually helped them to tide over times of difficulty and danger, to keep their plant well to the front in every way, and, in the matter of repairs and improvements, to make the works equal to the demands they might have to meet. Under these circumstances, a company possessed that important *desideratum*—a moderate and uninflated capital. The subject was, as he had said, one upon which there was sure to be a great deal of difference of opinion. They could not be all corporation men, neither could they be all company men; and they all had their own ways of looking at the question. But he was glad Mr. Williamson had brought the matter under their attention.

Mr. Stormonth thought, after the fierce onslaught that had been made upon the reader of the paper, it was time someone came to his assistance. One thing struck him in connection with the paper and the remarks it had elicited, and that was that Mr. Williamson had not made a single abstract statement; whereas, in his (Mr. Stormonth's) judgment, their worthy Secretary had made a number of them. Mr. Williamson's contention was that the interests of consumers were safer in the hands of corporations or town commissioners than they were in the hands of companies; and he had supported the position he had taken up by facts and figures which could not be controverted. It was all very well for Mr. Salmon to say he was sure that consumers were better and more fairly treated by companies than by corporations; but had he produced a single fact or figure to prove the truth of his assertion? No; he merely made the statement, and adduced nothing in the shape of statistics in order to convince them that his view was right. What the consumer wanted was cheap gas, and all the consumer was concerned about was the amount of his bill at the end of the quarter. He wished it to be clearly understood that he did not endorse all the opinions Mr. Williamson had expressed in his paper—in fact, there were several statements with which he could not possibly agree for a moment. For instance, there was the Bill that Mr. Williamson had suggested; and he (Mr. Stormonth) could only characterize the idea as a most remarkable one. He did not anticipate that any member of Parliament could be induced to take it in hand; but if one was found who was foolish enough to do so, he would be laughed at, and deservedly, by all common-sense men. With regard to Mr. Salmon's statement, that a corporation or a board of town commissioners would not carry their lighting system beyond a certain limit, he thought that gentleman was laboring under a mistake. He (Mr. Stormonth) was under the impression that they were bound to do it. For the purposes of his argument, Mr. Williamson had compared Coleraine, the town with which he (Mr. Stormonth) was connected, with Queenstown. Now, although Queenstown was a much larger place than Coleraine, the comparison was most favorable to the latter. Geographically speaking, both places were very similarly situated; and while in Queenstown gas was sold at 5s. per 1,000 cubic feet, the rate in Coleraine was only 4s. 2d. For this amount good gas of 18-candle power was supplied to the public; and the works was not in any way starved. He did not deny that, under a corporation, there was a danger of the members misappropriating surpluses, by devoting them to other purposes than that for which they were originally intended. But, speaking of his own Board, the Coleraine Town Commissioners, he should say that, although he did not agree altogether with the policy of the Commissioners, it was a very wise one after all. Their policy was to reduce the capital as far as possible. Last year his works turned out 13,000,000 cubic feet of gas; and they were as good as those to be found in any place of similar size.

Mr. Tully inquired what was the original capital expended on the Coleraine works.

Mr. Stormonth replied that this was a question which he was not in a position to answer. He might say, however, that the works were built in 1845 by the Town Commissioners.

Mr. Tully said that when a corporation obtained possession of gas works they rebuilt them altogether; and, of course, they were then in a position to carry them on more economically. Speaking of his own works at Sligo, he found them in a state of dilapidation. There was a leakage of 65 per cent.; and he could not purify the gas. If the exhauster was stopped, the gas went out at the hydraulic main. He had no scrubbers;

and the plant generally was in a state of complete wreck. Of course, they had first of all to set to work to put the place in order; and the Directors raised £2,000 on mortgage—stating that they could not give him any more. They at once went ahead, and spent £4,000. They substituted a steam engine for the old gas engine, put in scrubbers—in fact, remodelled the place altogether; but, even with what had been accomplished, he should consider that he had done good work if he brought the place into form in five years' time. The advantage possessed by corporations in the matter of gas supply was that they had pleaty of money with which to put their works in order and keep them so.

Mr. Waddell said that what struck him most forcibly, when listening to Mr. Williamson's paper, was the figures he had quoted to support his arguments; and it appeared to him (Mr. Waddell) that they must refer to some years ago. He could, however, speak with certainty about his own works at Newtownards; and the figures given by Mr. Williamson with regard to them were incorrect.

Mr. Williamson explained that he took the figures from the statistics for 1890.'

Mr. Waddell said he did not supply any figures with reference to his works. However, on the broad question, there were many instances that could be used as arguments on both sides; but, as a general rule, he thought a local body representative of the people, such as a corporation or a board of town commissioners, had a little more sympathy for the public than a company. Speaking of his own town, the comparison of the works before the Town Commissioners obtained possession of them, with the condition they were in now, was very much in favor of the Commissioners. Previous to the transfer of the works, the charge for gas was 6s. 8d. per 1,000 cubic feet, with a rent of 4s. a year for the meters, whereas now it was 4s. 2d.; and when percentages, etc., were taken off, the charge was brought down to something like 3s. 7d. to the larger consumers. This looked very well for the Commissioners; but the same men who had formerly been connected with the management of the Gas Company were now members of the Board of Commissioners.

Mr. Salmon agreed with Mr. Waddell that the figures given by Mr. Williamson must be old, as they did not correspond with the true figures in some cases with which he was acquainted.

Mr. B. Merrilees (Castleblaney) thought it would have been of great assistance to the members in considering this matter if they could have had before them the price of coal in the different places alluded to in the paper, and the cost of its carriage.

Mr. Williamson said he could not give information of this character.

Mr. Tully considered it would have been an advantage if Mr. Williamson could have given a short history of the gas works in each of the towns to which he had alluded.

Mr. Williamson said he had furnished all the information with regard to the different places that he could possibly obtain. As to the figures he had cited, the accuracy of which had been questioned, all he had to say was that he obtained them from the statistics for 1890, which were the only ones at present available.

The Secretary, referring to the statement of Mr. Waddell that he did not supply any figures, said that, if managers did not send in their statistics, they must take the consequences.

Mr. Valon said the question raised by Mr. Williamson's excellent paper, which had been so ably discussed by the members who had spoken—namely, as to which management was best, that of a corporation or that of a company—was a very vexed one among gas men. It at once resolved itself into two parts—first, were the consumers better off; and secondly, were the managers better off, under a corporation than under a company? The interests of the consumers and the interests of the managers did not always run together; and the question had therefore to be considered in a twofold aspect. It was possible for the manager to be well off under a corporation, and the consumers to be badly off, and *vice versa*; and the same remarks applied to consumers and managers who were under the control of companies. In considering this question, they must start, in the first instance, with the conviction that there was something to be said on both sides. In certain cases, the consumers were better off under corporations; in others, under companies. It was the same with managers. He was a corporation man; but he was also a company man. He was engineer for both corporations and companies; and at Ramsgate (his own place) he was under the Corporation, who had control of both the gas and the water supply. This being the case, he thought they would allow that he was in a position to look at the subject from an impartial and unprejudiced point of view. They should not, in trying to do justice to corporations, at the same time do injustice to companies; neither, on the other hand, should they, in trying to be just to companies, be unjust to corporations. He knew certain companies—perhaps it would be better not to mention names, but he could do so if the members desired it—that served the consumers quite as well as it was possible for any corporation to do. Speaking only of England, because he did not know much about the economy of things in Ireland, he thought it must be admitted that corporations, as a general rule, served their consumers better than companies. They all knew that the former made large profits; and these were dealt with sometimes judiciously, at other times injudiciously. It should be remembered, however, that where works were erected and controlled by a corporation, the rates were made responsible for the cost both of erection and maintenance; and, therefore, while it was fair that the consumer should get his just share of the profits, it was not fair that he should get it all. Under such circumstances, the profit should, with all justice, be fairly divided between the consumer and the ratepayer. The ratepayer was certainly entitled to something, because, in case of a loss in the working, it would fall as a charge upon the rates. It did not, therefore, require any argument to prove that it was right and just that the ratepayer was entitled to consideration in the division of any surplus or profits resulting from the works. He had in his mind instances of corporations who dealt with their profits in this equitable style. The gas was sold at a fairly low price; and at the end of the financial year, the balance of profit was fairly divided between the consumers and ratepayers. To take a case, let them suppose that, at the end of a year's working, a corporation had from their gas works a profit balance of £5,000—any figure would do; but let them take £5,000. In dealing with this sum, half of it would be given to the district rate, or other funds for the benefit and relief of the general rate upon the community, and the other half returned to the pocket of each of the consumers, in proportion to the quantity of gas consumed during the year. In his opinion, this was the fairest and most equitable way of dealing with the profits of any gas works controlled by a corporate body. Was it a just thing to find a corporation transferring the entire profits of the gas undertaking to such purposes as the improvement of the city and the erection of large halls and other buildings? Speaking for himself, he did not think it was. He considered that this was not the proper way to dispose of the profits resulting from the corporate management of gas works. Speaking of the interests of the consumers, he believed there could be very little doubt that, as a general rule, they received more benefit, and were generally better off, under a corporation than they were when the supply of gas was in the hands of a company. With regard to Mr. Williamson's suggestions as to the transfer of gas works from companies to corporations, there could be no disputing the fact that it would pay corporations very well if the companies could be induced to come forward and say they would consent to the transfer of their property at the very lowest possible cost. He remembered one case in which a corporation bought the gas works from a company, paying the latter for it from £180,000 to £200,000, which was at the rate of eight times the original invested capital; and notwithstanding this very large sum, the corporation, on gaining possession of the property, were able, in the course of time, to reconstruct the entire works, reduce the price of gas, and at the end of every year to leave a large margin for the benefit and relief of the general rates. This was a case with which he was personally acquainted—one in which the corporation concerned were dealt with by the selling company as hardly as possible; and still they were able to do all he had stated. So much for the question of the interests of the consumers under corporations and companies. He now came to the consideration of the second branch of the subject—namely, the management. In discussing the question as to whether managers were better off under corporations or companies, he must again remark that there was something to be said on both sides. In his own experience, he had known careless directors of companies and careless members of corporations; and, on the other hand, he had met directors and corporations who were most zealous in the discharge of their duties, and in looking after the interests committed to their care. Speaking first of corporations, the difficulty with regard to them was that they were a shifting body. They might get a very good man whom they desired to keep, but they could not; and he would go away. Then, again, they might get a very bad one—a man who was always meddling and interfering at the wrong time and place; and they would desire to get rid of him. But here again they failed; and the objectionable man remained on. It should be remembered that they had to deal with a man as part of a body, not as an individual. There were men who sought positions on corporations, actuated by a desire to do some good for the public; and therefore they should give them credit for the best of intentions. As a general rule, men who came forward with honesty of purpose generally succeeded in the end. To sum up his experience, he thought that, where a gas undertaking was fairly purchased, properly conducted, and the manager enjoyed full and legiti-

mate freedom, it could not be disputed that works which were controlled by the representatives of the public in the interests of the people, must be much better than those controlled by a company entirely in their own interest.

Mr. Williamson, in reply, thanked the different members who had spoken for the complimentary terms in which they had referred to his paper, and expressed the pleasure he felt at the useful discussion which he had opened. Remarks had been made with regard to the accuracy of his figures; and in this connection, he desired to say that he had no very great interest in the selection of the figures to support his arguments. It was through the kindness of Mr. M'Callum that he had been able to quote the particulars from the statistics of 1890. He had been greatly struck with the comparison of the price of gas under corporations and companies; and it proved to him that benefits were to be derived from corporate management that could not be obtained from companies. Corporations had no dividend to pay; and therefore the money went to the reduction of the price of gas. With regard to the remarks of the Secretary, if any gentleman could speak with authority on behalf of companies, Mr. Whimster could. In Armagh that gentleman supplied the consumers with gas at a very cheap rate, considering the circumstances under which he had to work, and the difficulties with which he had to contend. When he (Mr. Williamson) advocated the purchase of gas undertakings by local authorities, his reason was that the capital would be reduced in this way. The money which would otherwise go to pay the dividend would be more than sufficient to meet the instalments of the sinking fund; and in the course of time, the works would become the sole property of the ratepayers. He thought Mr. Valon had put the matter very fairly before the meeting; and he was glad that a gentleman whose opinions were entitled to such weight and attention was in favor of the corporate management of gas undertakings.

Arc Lighting and Hazards.

By Mr. George P. Low.

With the advent of the incandescent electric lamp the fire underwriter believed he saw the dawning of the day when the hazard attending the production and use of artificial light would be greatly reduced, if not entirely eliminated. The idea of a minute thread-like substance, completely encased in glass and maintained at intense luminosity with no application of external heat, without recourse to the use of inflammable or explosive oils and gases, and without open flame, at once impressed its utility upon his mind, and nearly all pronounced the new light to be simply perfection. Though this first impression is now verified, it was not long before it became discredited, and with the comparatively great number of fires that occurred in the early days of incandescent lighting the fire underwriter was not slow in appreciating the fact, for the time forgotten, that artificial light, no matter what its form, can be produced at present only through agencies that are convertible into heat, for human ingenuity has not yet devised a commercially successful light without accompanying heat. In all existing methods of illumination heat is produced that it may give light, and wherever heat may occur there the fire underwriter recognizes a source of danger and at once sets about to eliminate the hazard, or to devise means that will reduce it to a minimum. It is hard to understand why insurance interests and not municipalities should have been called upon to enforce requirements that would effect the safe installation of electric circuits. Probably it is because the underwriter is quick to perceive a danger, and equally ready to avert it, but be this as it may, and aside from the laudable efforts of a few of the leading electrical concerns, the only endeavors made to restrict the dangers in question have been put forth by insurance people. City governments have enforced fire ordinances and sanitary and health laws, but, singularly enough, they have done virtually nothing toward enacting electrical laws, even though they are equally important to the public safety. All this has fallen to the fire underwriters, and from ocean to ocean their requirements are looked to as authority.

It is admitted that insurance people have made mistakes in the efforts they have made, in partial proof of which it is only necessary to refer to the action of a prominent Eastern board in adopting an asbestos fiber or a covering of cotton soaked in lead paint as the standard insulation, simply because it would not burn. This covering is yet known as underwriter's insulation, though in electrical circles it is facetiously termed "undertaker's wire;" and but a few brief experiments were necessary to prove its unreliability for general use. Considering the fact that the board in question was reaching out into a new field explored as yet by no one, the mistake was natural, and is easily pardoned. One can have no appreciation of the magnitude of the task of framing requirements to meet any or all cases until he has tried it, and the longer he works the stronger will grow the conviction that it is impossible to draft a set of rules that shall cover even every ordinary case that may arise. Some application of electricity has worked itself into every branch of industry, and the conditions under which the electric current is used are, therefore, as diversified as the channels of human existence. Different surroundings may exert widely different effects upon electric apparatus, which may in turn give rise to various troubles.

With the exception of a new system of alternating current arc lighting, all systems of arc lighting are operated by continuous currents, and from their very nature continuous currents carry a hazard unknown to alternating currents. I refer to what is known as electrolysis, or electrolytic action, which is most easily described by referring to an electroplating bath. Take silver plating, for instance. A sheet of silver is connected to the positive pole of a suitable battery, such as a storage battery, and is then immersed in a solution of silver called the electrolyte. The article to be plated is connected to the negative pole of the battery, when through a peculiar electro-chemical action particles of silver are taken from the anode—as the silver sheet connected to the positive pole is called—and deposited upon the cathode, or the article to be plated. There is, in fact, a constant taking away of metal from the anode, and an equally great deposition of it upon the cathode. It is evident, therefore, that the anode must gradually wear away until it is finally consumed, in which case its entire volume will be transferred through the electrolyte and distributed over the surface of the article to be plated. Accurately speaking, there is not a transfer of solid particles of metal, but what does occur amounts to the same thing; hence for the purposes of this paper the transfer of metal through an electrotyte may be considered as actual.

Let us see now what figure electrolysis cuts in creating a hazard from fire. Take, for instance, a small store that is lighted with four arc lights. The wires enter through an awning, and are separated the regulation 10 inches. There being four lamps within the store, the potential difference of the wires at the point of entrance is consequently 200 volts. The insulation covering the wires, though sufficient for all purposes in dry weather, is not water proof, and the wire is not protected from the awning by waterproof tubes of glass or hard rubber. A shower of rain comes up, the awning and of course the wires become wet, and does not it occur to you that a plating bath, as complete as any ever devised, exists there on the awning? One of the wires is the positive pole or anode, equivalent to that of a 200 volt dynamo. The other wire forms the negative pole or cathode, and between them is the moisture on the boards or cloth of the awning, which forms the electrolyte. For every hour during which the lamps burn a definite amount of copper is taken from the positive wire, transmitted thence electro-chemically through the poor insulation of the wire—insulation in name only—and the wet awning, and is deposited upon the negative pole. The copper is merely carried along with the current as it leaks through the conducting medium of moisture. True, the amount so carried across is extremely small, so small indeed that it may take years to make a visible effect upon the positive wire, but the time will surely come when the anodal wire will be so reduced in size that the current it must carry will maintain it sometimes at a white heat, then finally it will break and an arc will be maintained across the terminals. The hazard of a red-hot wire resting against woodwork is too obvious to require more than merest mention, but in an electric arc is found the most intense artificial heat, in which many of the most refractory substances readily yield. The hazards attending their accidental existence and maintained is inestimably great; indeed, the many "awning fires" from electric lights that occurred until comparatively recently with alarming frequency were all directly attributable to unlooked for heating or arcing due to electrolysis. It took years of experience to learn the nature of this trouble, and now it may be entirely obviated by devoting proper care to the insulating and running of conducting wires.

Electrolysis may occur, as I have said before, in all continuous current circuits, whether in arc, in incandescent or in power systems. It is most far-reaching in its action, and if you will recall the illustration given in explaining the personal hazard from arc circuits, where a fireman was supposed to have received a 250-volt shock through a "ground," on the circuit a mile away, I shall find pleasure in showing you another of the dangers of "grounded" circuits. We will presume, as in the example referred to, that an arc circuit of 50 lights is grounded at a point near the tenth lamp, and that at the point beyond the fifteenth lamp the wire passes unprotected through an outer brick wall. Different gas, water and soil pipes are against the wall, which renders it an excellent ground during the wet season. Is it not plain then that the wire passing through the wall becomes as one pole of a 250-volt dynamo—the positive pole, for instance, while the metal piping referred to be-

comes the negative pole through the ground existing at the tenth lamp, and that the moist brick wall forms the electrolyte? It is immaterial whether the ground at the tenth lamp be 10 inches or 10 miles distant, the positive wire will be slowly worn away until finally it parts, an arc is formed, and another possibility of a conflagration exists. Frequently I have met electric lighting men who in opposing the suggestion of better protection to wires run in places liable to dampness have retorted that "the wires have been the way they are for three years and if they will ever give trouble they would have done so in that time." Here let me offer a word to my electric lighting friends. The competent insurance inspector for electric lighting, in addition to the knowledge gained from his own researches and labors in the electrical field, holds a position that gives him a personal acquaintance with each and every electrician of note in his section of the country. He periodically visits each and every plant, he avails himself of the opportunity to familiarize himself with all manner of dynamo electric machinery and accessory apparatus, and above all, he adds to his stock of knowledge by bits of priceless information garnered from the experience of every electrical concern in his territory. Whether that experience be profitable or disastrous, the insurance inspector is one of the few who learns its moral, and the fire underwriter is the one who gratuitously extends this information, so carefully gathered, to all who have use for it. Our friend whose installation is defective, yet who has had no trouble for three years and who argues, therefore, that the occurrence of a fire from his circuits is an impossibility, falls into a fatal error from which he must some day extricate himself as best he may. I have seen wires originally half as large as a lead pencil reduced to one-third or one-quarter of their cross section, and even severed altogether by electrolytic action. Other wires which were originally between one-sixteenth and one-eighth of an inch in diameter, I have seen reduced to the diameter of a thread, others to that of a hair, others completely worn away and the severed ends reduced to needle-like points, others to needle-like points from which globules of copper depended, showing that an arc had existed, still other cases where the woodwork around the globule-tipped terminals had been burned for a radius of 20 inches or more, proving conclusively that electrolysis, the incendiary, had started its work well. In one of the last-named cases the wires merely rested against plaster, and the origin of the fire is only traceable to—what do you suppose? Simply to the moisture absorbed by the plaster from the air, to the use of a non-moisture proof insulation and to electrolysis. Some may contend that this wearing away is simply corrosion or verdigris. If such is the case, why is it that only one wire is reduced in size, why is it that that wire is always the positive, and why is it that alternating circuits are not so affected? It may occur to some that water, universally esteemed as the natural enemy of fire, indirectly becomes its origin through electrolysis. For the time this may appear singular, but not more so than in a number of cases familiar to all fire underwriters in which water causes spontaneous combustion. In unslaked lime, all that is needed to raise it to a temperature sufficient to ignite wood is the application of a sufficient quantity of water. The moral is, then, keep water away from unslaked lime. If two bare wires, separated say 2 inches, run parallel through a piece of dry wood, if the wires carry sufficient potential, all that is necessary to ignite the wood is to wet it. Apply the same moral: keep moisture away from the wires and the danger is effectually averted. Indeed, no rule is more conducive to safety in installing all electric circuits than that of avoiding places where dampness or moisture may possibly exist. A well known local electrician, fully appreciating the importance of this rule, recently expressed an impromptu opinion that, electrically speaking, "everything that is waterproof is fireproof." Though not literally true, the saying is worth remembering.

Before leaving the subject of constant current circuits it may be well to mention a few pernicious practices which are yet prevalent and which should be discouraged by every means. First and above all, I believe the greatest evil to be the burning of incandescent lamps upon arc circuits, constituting the abomination called "multiple series" lighting. The system is easily described: Take, for example, ten incandescent lamps, each of the same resistance and each requiring one ampere to burn it. Place them all side by side, joining one pole of each lamp to a common wire, which we will call the positive pole and then uniting the remaining pole of each lamp to a second common wire, called for convenience the negative pole. The lamps then are connected in parallel, or in multiple. As each lamp consumes one ampere it is evident that the group of ten lamps will consume ten amperes, hence if the group of lamps be introduced in series into an arc circuit of ten amperes, each lamp will have its proper current and we have what is commonly, though erroneously, called a multiple series of incandescent lamps. The object of the multiple series system is to furnish incandescent lights from arc circuits where incandescent circuits proper do not exist, and there are several reasons why the system is extra hazardous. In the first place the public is educated to believe that an incandescent lamp, merely from the fact that it is such, is perfectly safe. The property owner sees the multiple series incandescent lamp, believes in its harmlessness, handles it with the carelessness or impunity of ignorance, and some day after he has been brought back to life by the vigorous administration of restoratives, or perhaps during a conversation with the fire marshal upon the mysterious cause of the fire that cleaned him out, he may learn that an incandescent lamp which burns on a 3,000 volt arc circuit is not perfectly harmless. Every respect is paid to an arc lamp. No one who is not familiar with it cares to even approach it, yet each multiple series incandescent lamp is at the same potential and the group carries precisely the same current that operates its more majestic brother, the formidable arc lamp. Another form of incandescent lighting equally hazardous with the multiple series system is the plain series incandescent system. The system is identical with arc systems as to the arrangement of the circuit, the only difference being that incandescent lamps are inserted into the circuit direct in lieu of arc lamps. In the Heisler series incandescent system an alternating current of five amperes is driven serially through each incandescent lamp. As each of these lamps absorbs approximately fifteen volts, if 300 lamps are in the circuit, as sometimes may occur, the line will have a potential of about 4,500 volts. When it is remembered that an alternating current of 1,800 volts was used in the electrocution of the four murderers at Sing Sing, I think no one will dispute the assertion that an alternating circuit of 4,500 volts potential is a good thing to let alone in more ways than one, for wherever the hazard to life is great, the hazard to property is equally so. In my opinion, multiple series systems and series incandescent systems should be generally excluded from all insured buildings. There is now no legitimate reason why multiple series lights should be found in any city, and I note with satisfaction that they are rapidly going out of use. As to series incandescent, their proper sphere is for street lighting. Doubtless some one is asking how these systems can be distinguished from the ordinary and safe incandescent systems. If a single wire comes into a building and goes to one lamp, then to another, then to another, taking in each lamp in the premises serially, one by one, you may know that the system is a simple series system, like an arc lighting system. Being a series system, and inasmuch as incandescents are burned from it, you may be sure that it is a series incandescent system. The ordinary incandescent system has many wires of different sizes, but consists essentially of two wires, across which are placed the lamps as rungs are placed in a ladder. This is called the multiple or multiple arc system of wiring, and lamps so arranged may be turned on or off singly, or in any manner desired, and they may be of any number. In the multiple series, however, they are always run in groups, and the total number of lights in a certain place is always some multiple of a given number. Most multiple series lights are burned from the Brush system, and the number of lights in a group is generally eight. It is impossible to extinguish any light without dimming the remainder. A further identification for the Brush multiple series system is a little black iron box with three incandescent lamps on top of it. This box is generally put up against the wall in some out of the way place. In addition to the regular group characteristic the Thomson Houston multiple series system may be known by its abnormally large and well ventilated socket. In many cities electric motors are placed in constant current circuits in series and operated in just the same manner as arc lights. It follows then that when this is done the entire electrical energy of the circuit goes through each motor regardless of its size. In other words, if a constant current circuit is operated by a dynamo that puts electricity to the equivalent of fifty horse power into the circuit, the entire fifty horse power goes through the little sewing machine motor and the big pumping motor with equal facility. The difference is that the resistance of the sewing machine motor is such that, in addition to carrying the ten amperes for instance of the circuit it *absorbs* sufficient voltage to give it the electrical energy in watts requisite to produce the necessary mechanical power required to drive the sewing machine. The pumping motor also takes the ten amperes, but the voltage it absorbs is far more than that of the little motor referred to, because of the greater amount of electrical energy it must utilize in order to return its full power. As in arc lighting, the dynamo supplying current for series motor circuits is so constructed that it automatically generates or ceases to generate the voltage which is absorbed or which ceases to be absorbed the instant any motor is started or stopped. The voltage of such power circuits is therefore constantly changing. One moment it may be 1,000 volts, while in the next minute sufficient motors may have been started up to raise the potential to 3,000 volts. It is evident then that arc lighting circuits and

constant current motor circuits are practically the same and their hazards are, therefore, about identical. I have found some credence given to the belief that constant current motors and dynamos of the same horse power have the same physicial hazards. The error of this belief will be apparent when it is remembered that though the brushes of the motor may show a pressure of say 75 volts, still the ten amperes that are flowing through its coils are being driven by a potential of possibly 3,000 volts. As a dynamo, the arc the machine would maintain would be insignificant indeed compared with the wicked two or three foot stream of electrical fire that would be maintained across the broken terminals of the motor circuit. As with arc lamps it is well to keep at a respectful distance from these motors which, by the way, are the only kind now in use in San Francisco. Wires leading to them must always be put up with care, and in no instance should they come in contact with wood work or anything except their proper insulators, nor should they be run in any place liable to handling or where they may be possibly interfered with by merchandise, individuals or otherwise. Each such motor circuit entering a building should, moreover, be provided with an absolute break switch, through the use of which the current in the building may be instantly diverted from the motor and out of the building.

Before bringing this paper to a close I find myself tempted to mention a few of the many pernicious practices which are forbidden in insurance requirements, and which, if indulged in, will certainly occasion no little annoyance or pecuniary loss to the owner of the plant, if they do not cause fire. Among these condemned practices is the use of soft rubber tubing, which cracks and becomes incapable of repelling moisture. It was once a frequent practice to secure wires in place by the use of metallic staples, but it was found that they cut the insulation and became "live"—that is, they form an exposed part of the circuit by coming into contact with the conductor. Porcelain knobs are unsuitable for outside work, for the reason principally that they afford a competent insulation only in dry weather, when it is least needed. Hard rubber hooks, which were once well thought of by many for inside arc work, have dropped into disuse because of several unfortunate characteristics. It is seldom safe to permit the suspension of arc lamps by leads—that is, by the wires which supply them with current, the objections being that the swaying of the lamp is liable to wear through the insulation at the points where the leads are secured, while the weight of the lamp may pull a lead from its proper contact piece, thereby occasioning its heating or else a very dangerous arc. Arc lamps, if used indoors, are never safe unless furnished with glass globes, and if placed in show windows or elsewhere in close proximity to easily ignited fabrics or other similar materials, the lamps should have the further protection of a spark arrester. The use of such an appliance is seldom required. The precaution of a globe is necessary, however, to prevent the falling of heated flakes or particles of carbon or copper that continually drop from a burning lamp. One never knows when or where dampness may occur in a building, and when so much depends on the keeping of moisture from conductors, it is essential that all inside high potential wires be covered with an insulation that is absolutely waterproof, and an additianal safeguard is assured if each high potential circuit entering a building is provided with an absolute break switch, which, when thrown "off," will leave the interior wire as harmless as a clothesline. To say more in this direction would be to repeat what is fully set forth in the requirements of the fire underwriters governing the installation of high potential circuits.

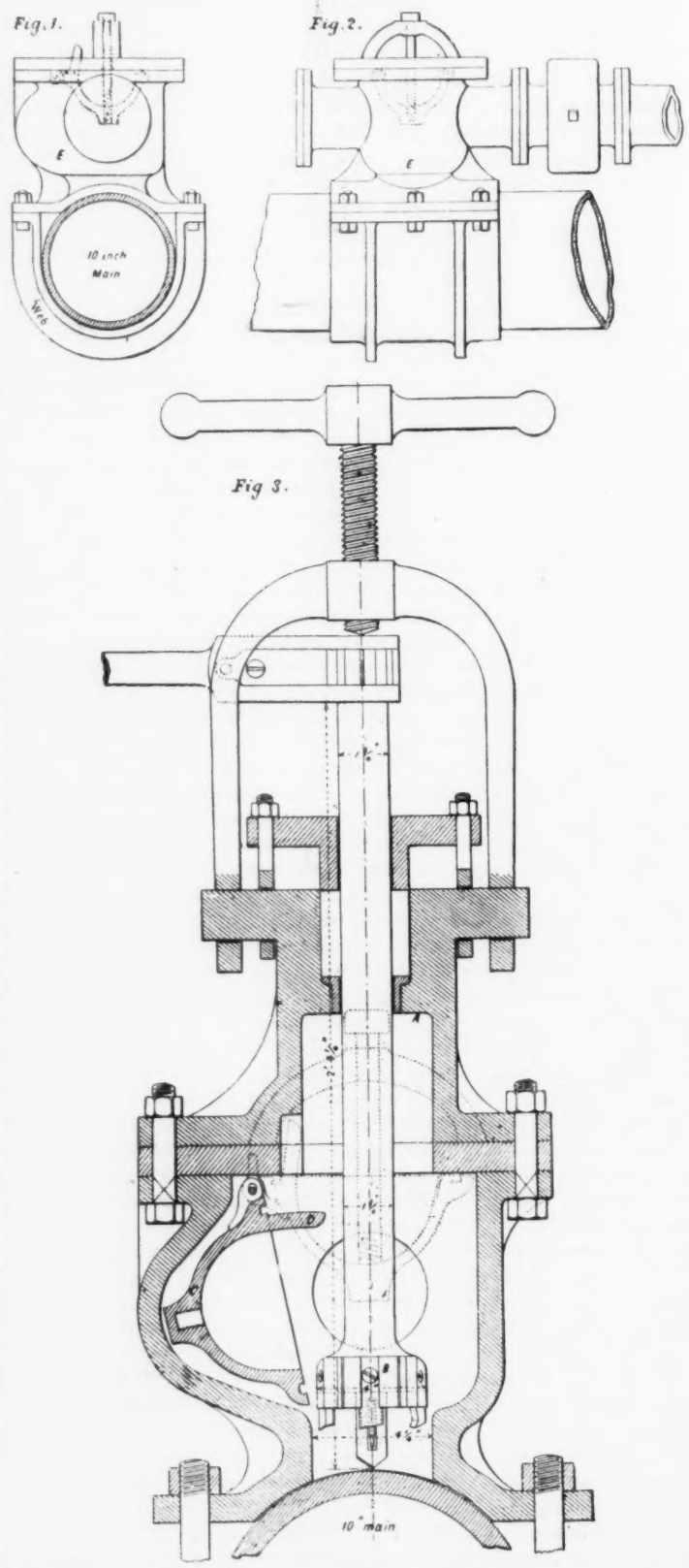
It must not be judged from what has been stated that I am an alarmist or that I believe the electric hazard to be great compared with the hazards of other more familiar agencies. To the contrary, I wish it to be understood that the danger or the absolute safety of an electric lighting or power plant depends entirely upon the manner of its installation, and to bring about a thorough understanding of the hazards of constant current systems in order that they may be provided against, is the aim of this paper. If I have succeeded in doing so, if only in part, I am satisfied.

Pearson's Apparatus for Drilling Water Mains.

The apparatus illustrated was designed by Mr. W. H. Pearson, Engineer to the Bristol (England) Water Works, for making large branch connections to trunk mains under pressure, carrying either water, gas, or compressed air, thus obviating the necessity for relieving the pressure in the pipes.

The chief features in the apparatus are the closed stuffing-box *A*, the drilling tool *B*, and the cup-shaped valve *C*. This latter is brought back on to the seat of the branch on the withdrawal of the drill by the horn *D* engaging with the drill spindle. The pressure drives the valve home against the seat and holds it there. If found necessary the valve is further secured from falling away from the seat by a crossbar and stud, but this is not found to be requisite in practice.

The cup drill has a central drill or boring bit projecting beyond its cutting edge. To this central drill are fitted a pair of small hinged arms or pawls, which fold in when the drill is boring the body of the



pipe or vessel. When the pipe is pierced the arms fall out and the disc of metal cut by the cup drill is transfixed on the central drill, and so prevented from falling into the pipe and forming an obstruction.

From the flange of the valve fixed on the branch *E* the branch pipe is led to wherever it is required. The apparatus can be further used by substituting for the cup valve the ordinary double-faced sluice valve between the branch casting or outlet *E* and the closed stuffing-box *A*. The cup drill is then passed through the valve, and after the hole is cut in the pipe it will be withdrawn past the door of the valve, which is then closed, thereby shutting off the water.

The branch is secured to the body of the pipes by a cast iron saddle piece enveloping the circumference of the pipe, as shown in Figs. 1 and 2, secured by bolts and nuts in the ordinary way, or by wrought iron straps if preferred.

The apparatus can be also applied to drilling and tapping holes for securing cooks in pipes under pressure. A hole is first drilled of the size required to suit the shank of the cock, and when this has been accomplished the drill is withdrawn, the cup-shaped valve or sluice valve being closed in each case as before described. The stuffing box and adjoining throat are then temporarily detached and a tap is substituted for the bit in the socket in the drill head. The stuffing box and throat are replaced, the valve opened, and the bored hole is then tapped, the tap being afterwards withdrawn in the same way as the drill.

After removal of the tap from the drill head, the cock which it is required to screw into the tapped hole, is affixed to the drill spindle and screwed into place. The drill spindle and stuffing box and adjoining throat are then removed.

The Care of a Boiler.

The proper care of a boiler is one of the most important things about a steam plant, and yet less attention is commonly given to the boiler than any other part of the machinery. There may be several reasons for this and one which shows up the most frequently, is that the engine with its finished parts and brass oil cups and steady running gives a better chance for display than does the boiler. The engine room seems to be the important part of the establishment and the place that receives the most attention, while the boiler is generally located as far out of the way as possible and receives the smallest amount of attention that can reasonably be given it. This is not the case in all plants, but in the majority of them the boiler is neglected, so that more time and attention can be given to the engine and its surroundings, and it is usually noticed that wherever there is a fine engine on which a show can be made, the boiler room will be found quite dirty, most of the apparatus required therein is in an uncleanly condition, more so than should be necessary from the amount of dirt and dust usually made in such places. Where the engine receives the larger amount of the attention, the boiler must of necessity be neglected and usually is, to a considerable extent, and is nearly always the case where the engineer does his own firing. All engineers know that the boiler is the most important piece of machinery about the plant, or at least should receive the greater amount of attention. Owing to the duties required of boiler and engine and the means employed for working them, it is understood that there is a possibility of accidents occuring in a short space of time which may be the cause of the destruction of the whole apparatus. When an engine breaks down, the destruction is usually confined to the one room and is seldom disastrous, for such accidents rarely occur, while anything that may happen to the boiler, and the possibilities are many, may be the cause of a large amount of damage.

We have no indicators for boilers that serve the purpose so fully as the steam engine indicator, and the noises produced are practically indications of the condition of the engine, but in a boiler there is nothing which corresponds to this, for although braces may be loose or broken, rivet heads corroded and eaten off, boiler plates grooved or pitted, initial strains present from the too free use of the drift pin, necessitated by the low price at which the boiler was furnished, crystalized plates, produced partly from the same cause, may either one be capable of causing a terrible accident, which, coming as it will without warning, may make the results most terrible. All these defects have been found in boilers, in some causes before an accident has occurred, but in others only from an examination of the wreck produced and of the fragment left, but in most cases their presence is unknown until the boiler is in a decidedly dangerous condition.

In plants where a fireman is employed a much cleaner fire room is usually found, and, occasionally, the fireman takes sufficient pride in his surroundings to keep the boiler front and other parts exposed to view reasonably clean, and some go so far as to keep all the fittings bright, the ceilings and walls whitewashed, pipes, dome, etc., nicely painted a deep jet black, and an air of tidiness all around. In such a place, it may be inferred, from a casual view, that the machinery of all kinds has excellent care and that the inside of the boiler receives fully as much attention and as close examination as the outside parts which make the show, and this is as it should be.

Some engineers have claimed, with a show of pride, that they have not had their boilers open for over six weeks, two months, or longer, as the case may be, apparently considering that such things are complimentary to their ability as an engineer. In some cases it is all right, no doubt, for any engineer that gives his boiler a careful examination and inspection every two or three months may be reasonably assured of its safe condition for that length of time, providing everything was found as it should be when the last examination was made. The use of mechanical boiler cleaners tends to increase the length of time between which examination of the interior of the boiler is made, as some of these devices are capable of keeping a boiler free from scale for several months time without special attention. But no boiler should be allowed to go so long without careful examination, for a sufficient amount of corrosion can take place within the time to change the condition of the boiler from that which would be considered safe to that which might be positively dangerous and unreliable under ordinary conditions of usage. A practical knowledge of the subject would indicate that every engineer, worthy of the name, who had charge of a boiler, would make a careful examination of both the inside and outside, at least, every month, closely examining all parts for signs of corrosion, grooving or pitting, sounding plates and laps in joints for unusual and unsafe conditions.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE Fort Wayne (Ind.) Electric Company between the dates of November, 1889 and August 1, 1891, filled 116 separate orders for the Company's Wood system of arc electric lighting. The orders stand for a total of 20,180 arc lamps. In the list we note that 12 gas companies are reported as having purchased plants to be operated in connection with their ordinary business. Of these the Louisville Company's order was the largest, that installation calling for equipment equal to the maintenance of 720 arcs.

AMMONIA concentrators have been placed in the San Francisco Gas Company's works, and also the gas works at Grand Rapids, Mich., by the Michigan Ammonia Work's proprietors. Our readers of course know that Mr. George N. Osius is Secretary and Treasurer of the Ammonia Works, and that his headquarters are at Detroit, Mich.

THE Glasgow (Scotland) Corporation Gas Committee has contracted for the construction of a new gasholder of mammoth dimensions, its capacity being put at 6,000,000 cubic feet. It will be of the three-lift order, with a diameter of 260 feet, the lifts to be about 45 feet each. The probable cost of the holder and tank completed is $250,000. Even with this holder in duty the works will hardly be in a safe position with respect to holder capacity, for the present storage provision is only equal to 12,000,000 cubic feet, while the maximum consumption last winter on several occasions exceeded 21,000,000 cubic feet. Further, the rate of increase in consumption in the past year was equal to 13.54 per cent.

THE annual meeting of the Tonawanda (N. Y.) Gas Light Company will be held on Wednesday of this week.

ON the first inst., the following schedule of gas rates went into operation at Chambersburg, Pa.:

Monthly Consumption.	Net Rate per M.
Under 1,000 cubic feet	$2.00
1,000 to 5,000 " "	1.85
5,000 and up " "	1.75

This is equivalent to a concession of 15 cents per 1,000 cubic feet from the rate that formerly prevailed.

A RECENT issue of the Savannah (Ga.) *News* says that the Pintsch system gas plant on East Broad street in that city is completed and in operation. The plant adjoins the works of the Mutual Gas Light Company, close by the yard of the Savannah, Florida and Western Railroad. The Pintsch gas is rapidly coming into favor as a lighting agent for railroad cars, and many favor it for the lighting of the Mississippi River boats. The new works are very complete in every respect, and have had the benefit of the supervison of Capt. David Douglass, Supt. of the United Gas Improvement Company's division in this city. About 9,000 feet of ¾-inch pipe have been laid from the generating and compressing works to the depots of the Georgia Central, the Tybee, and the Savannah, Florida and Western Railroad Companies, and the arrangements are such that a train of passenger coaches can be supplied in a very short while with gas sufficient for a 24 to 72 hours' journey. The cars on the Tybee Railroad and the new sleepers and passenger coaches on the Georgia Central are now using the Pintsch gas, and as rapidly as possible the old coaches on the Central, and also new ones that will be added, are to be fitted for the use of the gas. The Pullman Company has agreed to adopt the system as soon as a sufficient number of plants are put up

at convenient points throughout the country to enable them to obtain a sure supply of the gas.

THE Selectmen of Holliston, Mass., have finally granted a franchise to the organizers of the Holliston Gas and Electric Light Company, a stipulation in the concession being that "operations are to be commenced within a year" from the date of its acceptance. The officers of the Company are: President, M. F. Coughlin; Vice-President, A. L. Forbes; Secretary, G. B. Fiske; Treasurer, C. J. Driscoll.

IT would take a pretty good guesser to discover what the authorities of Kansas City, Mo., mean in their attempts to secure a contract for the public lighting of that city. Bids have been submitted based on the latest public lighting ordinances—and the latter follow one another with startling rapidity—and the same have been rejected as regularly as they were submitted. Here is the last official pronunciamento: "The Board of Public Works is hereby authorized and directed to advertise as they may deem proper for sealed bids for lighting the streets of the city with gas, gasoline, electric arc and incandescent lights, and to enter into contracts with the lowest and best bidders for the term of one year. Contracts for such lighting to be entered into on or before October 1, 1891, as follows: For 100 or more electric arc lights of 2,000-candle power; for 1,000 or more incandescent electric lights of not less than 16-candle power; for 1,000 or more gasoline lamps of not less than 16-candle power; for 1,000 or more gas lights of not less than 16-candle power—the candle power proposed to be furnished to be stated with each bid. Each bid shall state the price per light per year, for lamps to burn every night and all night, and the price per light to burn according to the moonlight schedule now in use in the city. Lamps shall be placed in position 30 days after the passage of the ordinance directing the location of same. All lettering on street lamps to be made by Board of Public Works as may hereafter be provided by ordinance. The Board of Public Works be and is hereby directed to obtain bids for furnishing 1,000 or more gasoline lamps, lamp posts and burners. The bidder in each case to state the kind of lamps, posts and burners proposed to be furnished. The said Board shall obtain sealed proposals for furnishing the gasoline for such lamps and for lighting and keeping the same in repair for one year. That said Board communicate and request from Mr. F. K. Hoover a statement of the price at which he will sell to the city the gasoline lamps and posts belonging to him and now being used for lighting the streets of the city. No proposal will be considered unless a cash deposit of $1,000 has been previously deposited with the City Comptroller and his certificate therefor accompanies the bid. Said Board of Public Works shall have the right to reject any and all bids. Within five days after the acceptance of such bid the successful bidder shall execute a bond to Kansas City in the sum of $5,000, to be approved by the City Comptroller, the form of such bond to be approved by the City Counsellor. The location and removal of all lights shall be made only by ordinance. Contracts entered into under or by virtue of this ordinance shall not bind nor take effect until duly approved by the Common Council. All ordinances or parts of ordinances in conflict with this ordinance are, inasmuch as they conflict with this ordinance, hereby repealed."

THE Norwalk (Conn.) Gas Light Company has refurnished its steam plant.

THE Morristown (N. J.) Gas Light Company has purchased the plot at the corner of Cole avenue and Water street.

DURING this season the Jamaica Plain (Mass.) Gas Company has increased its main system by placing four miles of pipe.

THE following very interesting letter, written by Mr. Sylvester Watts, under date of Aug. 6, from the "Hotel de l'Europe," Strasbourg, was recently received by a friend of his in this city: "Friend * * * *—One month ago, accompanied by wife and daughter, I left home, to be gone about one year, and have not given the gas business any thought since I left St. Louis, until to-day on passing the works in this city. Thinking of the gas business naturally led me to think of you, so I concluded to drop you a line about my travels. I sailed from New York, July 11, on the Gascogne, arriving at Havre on the 19th, and, after stopping at Rouen, went to Paris, where I remained two weeks. While I was in Paris it rained every day, and as it was disagreeably cold I concluded to go over to Switzerland, and on my way stopped here for four or five days. Will leave here about the 10th for Baden-Baden and Heidelberg, thence by way of Stutgart to Berne, Lucerne, and Geneva. We hope to spend October and November in Spain, going to Southern Italy in December, to Egypt in January, and then to Palestine, Turkey, and Greece. Returning to Italy, the route will then be to Vienna, Dresden, and Berlin, the spring and summer of 1892 to be spent in Russia, Sweden, and Norway, returning home in September, 1892. I expect by that time to have seen enough of this side. I heard before leaving home that you expected to locate in New York, and not knowing your address concluded I would address you in care of the AMERICAN GAS LIGHT JOURNAL. I will be on the lookout for anything new in our business, and should I find such will be glad to send an account of it to you. I do not expect to learn of any improvements in gas making proper, but may discover something of interest respecting the treatment of ammoniacal liquor. The gas companies on this side I learn are getting up some improved methods, but they keep very quiet about these things, and will not permit anyone to visit the part of their works devoted to the treatment of ammoniacal liquor. The liquor here in Strasbourg is worth to the Gas Company from 45 to 50 cents per ton of coal carbonized, so that, considering values here and at home, this would make the liquor worth at St. Louis from 60 to 70 cents per ton of coal carbonized. The streets here, as in Paris, are lighted with gas. A very few arcs may be met with in some sections, but even in the districts where the arcs are gas lamps are also used. Outside of a few large hotels in Paris I saw no incandescent electrics. Here I have not seen any. This is a city of 80,000 people, and the gas company carbonizes 25,000 tons of coal per annum. Candles are still used in sleeping apartments all over Europe. People here work by daylight and eat, drink and sleep at night. * * * Will be glad to hear from you. Yours very truly, SYLVESTER WATTS."

THE Pacific *Lumberman* asserts that the present production of petroleum in California is little if any short of 500,000 bbls. per annum, whereas according to the Census Bulletins the product is put at 149,027 bbls. Our authority states that it has figures that cannot be controverted proving the daily output of the Pico Canyon or Newhall district to be 400 bbls. daily, at Puente and Orange the daily flow is 150 bbls., and the Ventura, etc., district is said to yield 850 bbls.

THE Ironton Water Light and Power Company has filed articles of incorporation with the Secretary of State of Colorado. It is capitalized in $50,000, and the projectors are Messrs. A. R. Story, J. N. Casanovia and Josiah Winchester.

THE following opinion from Mr. A. H. Chetlain, Asst. Corporation Counsel of Chicago, will be read with interest: "In the matter of the question submitted to this department as to whether the city of Chicago is liable to the Chicago Gas Light and Coke Company for bills and expenses incurred in cutting and reconnecting its gas mains and pipes at the intersection of 25th street and Wabash avenue, and at other points, to enable the city to lay its water mains, I am of the opinion that the city is not liable, for the following reasons. The Chicago Gas Light and Coke Company by special charter from the Legislature of this State was given power and authority to lay pipes for conducting gas in any of the streets and avenues of this city; but this grant does not confer an interest in any particular parts of the streets or avenues, nor can it be construed as a surrender of the rights of the public to any future uses of such streets and avenues that public necessity and convenience may demand. The streets are primarily held for strictly public uses. Railways, gas companies and other similar agencies which are in effect private corporations are granted franchises in the streets only because they are quasi-public corporations, and are only granted such uses in the streets as are consistent with the public uses for which such streets are held. The rights of the city in its streets for the protection and benefit of the public and the welfare of the community are superior to those of quasi-public corporations, being secondary, must yield. The city, through its water department, supplies water to the public without gain to private persons, and as such is strictly a public agency. The law as it stands imposes the duty upon the city to supply water in adequate quantities to all its inhabitants and for all municipal purposes. The public health and safety of property demand an unfailing supply of water. When, therefore, as in this case, the public welfare and convenience require the laying of new water mains and the pipes of the Chicago Gas Light and Coke Company interfere with the laying of such mains, it becomes the duty of the Gas Company to make such changes of its pipes at its own expense, as will enable the city to lay its mains. As to the bill in question, there appears to be no claim that the Gas Company was put to any unnecessary changes, or that the bill was incurred by the negligent manner in which the city did its work."

WE understand that the proprietors of the Jefferson City (Mo.) Gas Light Company have determined to operate an incandescent electric lighting plant in connection with the gas works.

THE Peoples Gas and Electric Company, of Chillicothe, Mo., has been incorporated by Messrs. C. D. Jones, S. B. Harvey, C. Christonson, N. F. Freeman, W. B. Leach, F. B. Wheeler and M. W. Honey.

THE carbonizing plant of the Plymouth (Mass.) Gas Light Company is being doubled, which rather goes to show that the oldest town of New England proposes to keep up with the procession. Messrs. Odiorne and Copp, however, were never classed with the laggards.

MR. JOHN P. LOWRY has been appointed Receiver of the Nevada (Mo.) Gas and Electric Light Company, because of proceedings instituted by the Missouri, Kansas and Texas Trust Company before Judge D. P. Stratton, of the Circuit Court. Default in the interest payments on the bonded debt was the cause of the action.

GATES are being placed at all important points in the main system of the Keene (N. H.) Gas Light Company.

THOSE who favor the scheme of placing entire control of the public lighting supply in the hands of municipal authorities often point to Chicago as a brilliant example of the cheapness and efficiency with which such work can be carried on—especially with respect to electric lighting. Chicago has a municipal electric lighting system, under the immediate direction of Prof. Barrett, whose original argument for the necessary appropriation to install the plant was that the figures then put out would enable Chicago to thoroughly light the main streets of the city. As the proof of the pudding is supposed to be in the consumption of the same, it is now seen—in fact, it was so observed shortly after the system was put in operation—that the most remarkable feature about the station is its inadequacy.

THE following, from the St. Louis *Post-Dispatch*, of August 26th, explains itself: "The attempt of the Laclede Gas Company to bring non illuminating fuel gas into general use in St. Louis is a failure, and the Company, unless the consumption increases largely, will very soon stop supplying it to households. 'We made a canvass of the territory covered by the fuel gas mains last May,' explained Col. W. A. Stedman, General Manager of the Company, 'and succeeded in obtaining 80 consumers for whom meters were set and the gas turned on. The low price, 40 cents per 1,000 cubic feet, at which this gas was offered, led us to expect a rapid increase in the number of consumers and in the amount sold. We have been disappointed in this expectation. We have the plant to make the gas and a system of independent mains to distribute it, and we hoped to utilize these to their full capacity; but the number of consumers on these lines has decreased rather than increased, many having discontinued the use of fuel gas and returned to using the regular illuminating gas, especially where gas cooking stoves were used. There were complaints made as soon as the use of the fuel gas began. Those who had been using illuminating gas in their cooking stoves were impatient of the slower process of the fuel gas. The complaints were mostly that it took too long to cook anything; too long to boil water or to heat the ovens. Of course, fuel gas has not the intense and rapid heating power of the illuminating gas, and so it was to be expected that a greater volume of the former and a longer time would be required to produce a given amount of heat. All this was explained to the fuel gas consumers, but many preferred the intenser heating power and particularly the more rapid results obtained by the use of the other gas. Then the objection was made by some of the consumers that as the fuel gas required larger volumes to be consumed and a longer period of continued use to produce results, a great quantity of heat was lost by radiation, resulting in raising both the temperature of the room, and of the cook, unnecessarily. This was one among many reasons given for preferring the illuminating gas for cooking operations. "Its heat is intense, and the required temperature of oven or broiler is attained in a moment," said a consumer the other day; "there is no waiting to get up heat to cook with, and that is a great consideration in hot weather." A lady said she preferred the gas with which she could get breakfast in 20 minutes rather than a lower-priced gas that required 45 minutes for the same meal. So the original consumers have diminished in number until less than half remain. Fuel gas is non-luminous, and it is the illuminating elements in a gas which greatly increase the cost of its production. These same elements increase also very greatly the heating power of such gas. Our fuel gas has rather less than one-half the calorific power of our illuminating gas. The latter at our net price of $1.18 per 1,000 is really a very economical fuel, and our experience seems to indicate that our patrons prefer it on account of its greater energy and activity, and for the other reasons before stated, to the fuel gas at a lower price. The economy of the low-priced fuel gas is not very apparent where small quantities are used as in ordinary domestic operations. For example, a breakfast of steak or chops and a pan of biscuits and two quarts of water boiled for coffee would require the consumption of 12 feet of gas in an ordinary range at a cost of 1.4 cents with illuminating gas, and it is claimed that in an operation of this kind the saving of one-half cent is more than offset by the same results with fuel gas. However, as we have started in to make fuel gas, and cannot afford to have our fuel mains lying idle, if it is possible to have them earning something for us, we have concluded to cut the present price 25 per cent., and from the 1st of next month shall charge only 30 cents per 1,000 for non-illuminating fuel gas consumed after that date. Coal is very cheap here and although a gaseous fuel has many advantages, and the heat resulting from its combustion can generally be utilized with only a small percentage of loss, yet for house heating purposes very large quantities would be required, and to equal coal in economy for this purpose it would have to be sold as low as 5 cents per 1,000 feet at least. We hope at the low price of 30 cents per 1,000 to develop uses for our fuel gas which will warrant our continuing its distribution. Unless we secure a decided increase in its consumption in the near future, however, we shall be obliged to discontinue its manufacture, as only its sale in very considerable quantities will make the business remunerative at this price. There is always a certain amount of leakage in gas mains and the volume lost is the same, whether the consumption from the mains is large or small. Therefore, if the sales per mile of main are small, the proportion of lost gas, or the percentage of loss, is very heavy and correspondingly small when such sales are large. This consideration, of course, is a very potent one in determining whether we can afford to continue our experiment of furnishing a purely non-luminous fuel gas as an adjunct of our illuminating gas business.'"

THE proprietors of the West Duluth (Minn.) Light and Power Company are anxious to sell to the authorities of that village the plant that they have been operating there for some time. It has a capacity of 100 arcs (1,200 candle power) and 1,000 incandescents (16-candle power.) The price at first proposed was $87,500, but the figure was deemed so high that the people at once spoke out loudly against the carrying out of the sale. In fact, well-informed parties put the actual value of the plant not to exceed $37,500, which is quite another thing from the aforementioned $87,500.

MR. JOSEPH CRAIG, who for several years acted as Secretary and Treasurer of the Memphis (Tenn.) Gas Light Company, has resigned. His successor is Mr. D. F. Jett.

IN the New York *Herald's* financial columns for last Thursday the following reference to the Chicago gas situation is made: "The Chicago 'gas war' is becoming as 'windy' as the city in which it originates. Until now the 'big wind' has been made mainly by backers of the new Economic Gas and Fuel Company. While the stock of the Chicago gas has been steadily pounded, Wall street has been flooded every day with bulletins setting forth the great progress Messrs. Cummings, Kent, Yerkes and their associates were making with the plant of the new Economic Company and the inroads they would in time make upon the business of the Chicago Gas Company. Meanwhile it appears that officials of the latter have been quietly noting the amount of actual work done by their would-be rivals, and to-day published a bulletin embodying the following statements:—Up to date the Economic Company has laid in the city of Chicago less than 1¼ miles, the Chicago Gas Company having 1,100 miles. At the outset the Economic Company reported that it had 'contracted' for the laying of 75 miles of pipe. If the Company had all of that laid and in operation it could deliver about 120,000,000 cubic feet of gas yearly, as against the older Company's present capacity of 4,000,000,000 feet. But the Economic Company proposes to supply fuel as well as illuminating gas, which requires separate mains, so that if it had 75 miles of pipes laid only one-half would be available for illuminating gas. However, with the utmost despatch it cannot lay more than 25 miles between now and December, when winter weather would put an end to operations. The normal increase of consumption arising from the city's extension and growth of population is about 600,000,000 cubic feet a year (five times the capacity of the Economic's 75 miles if it were actually laid and all of it devoted to illuminating gas), and the Chicago Gas Company is now laying 100 miles of additional pipe to meet the demands of new consumers."

THIS is a very pretty fight as it stands, and one which is far from reflecting credit on either side to the controversy. In the meantime, the gas industry of the country looks on, hoping for the time when the end of the mud-throwing period of the contest will be at hand.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,

PROPRIETORS.

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MONDAY, SEPTEMBER 7, 1891.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks,

16 WALL ST., NEW YORK CITY.

SEPTEMBER 7.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	96½	98
Central	500,000	50	--	90
" Scrip	220,000	—	95	100
Equitable	4,000,000	100	118	120
" Bonds	1,000,000	—	106	108
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	110	115
Mutual	3,500,000	100	118	121
" Bonds	1,500,000	—	100	102
Municipal, Bonds	750,000		—	—
Northern		50	—	—
" Bonds	150,000	—	—	100
Standard Gas Co—				
Common Stock	5,000,000	100	—	48
Preferred	5,000,000	100	—	90
Yonkers		50	112	—
Richmond Co., S. I.	346,000	50	—	—
" Bonds	20,000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	95	98
Citizens	1,200,000	20	—	78
" S. F. Bonds	320,000	1000	100	103
Fulton Municipal	3,000,000	100	115	120
" Bonds	300,000		100	105
Peoples	1,000,000	10	70	73
" Bonds (7's)	368,000	—	100	—
" " (6's)	94,000	—	100	—
Metropolitan	870,000	100	90	97
" Bonds (5's)	70,000	—	—	—
Nassau	1,000,000	25	134	—
" Ctfs	700,000	1000	98	100
Williamsburgh	1,000,000	50	100	—
" Bonds	1,000,000	—	105	109
Out of Town Gas Companies.				
Boston United Gas Co.—				
1st Series S.F. Trust	7,000,000	1000	—	84½
2d " " "	3,000,000	1000	70	—
Bay State Gas Co.—				
Stock	5,000,000	50	51	58
Income Bonds	2,000,000	1000	98	102
Buffalo Mutual, N. Y.	750,000	100	105	110
" Bonds	200,000	1000	95	100
Citizens, Newark	1,000,000	50	155	160
" " Bonds	45,000	—	—	—
Chicago Gas Company	25,000,000	100	50⅛	50¼
Chicago Gas Light & Coke Co.—				
G't'd Gold Bonds	7,650,000	1000	90	91½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1000	—	97½
People's Gas and Coke Co., Chicago—				
1st Mortgage	2,100,000	1000	—	100
2d "	2,500,000	1000	—	100½
Consumers Gas Light Co., Jersey City	2,000,000	100	12	15
Bonds	600,000	1000	70	75
Cincinnati G. & C. Co.	6,500,000	100	207	209
Consumers Toronto	1,000,000	50	169	172
Central, S. F., Cal			90	—
Capital, Sacramento, Cal			58	
Consolidated, Balt.	11,000,000	100	—	44⅓
" Bonds	6,400,000		107	107½
Citizens Gas Lt. Co., Rochester, N. Y.	500,000	—	85	110
Bonds	250,000		—	—
East River Gas Co., Long Island City	1,000,000	100	100	105
Bonds	500,000	100	100	102
Hartford, Conn	750,000	25	109	114
Jersey City	750,000	20	165	170
Louisville, Ky	2,570,000	50	125	130
Little Falls, N. Y.	50,000	100	—	100
" Bonds	25,000	—	100	103

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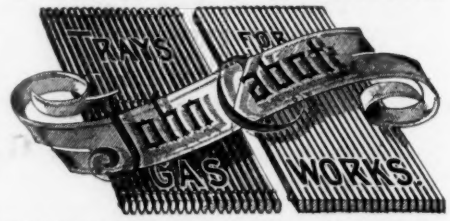

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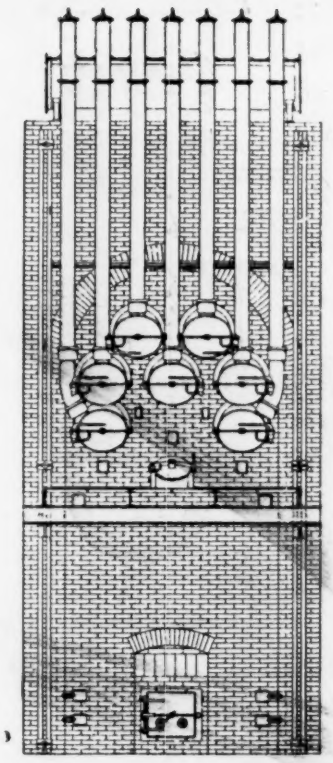

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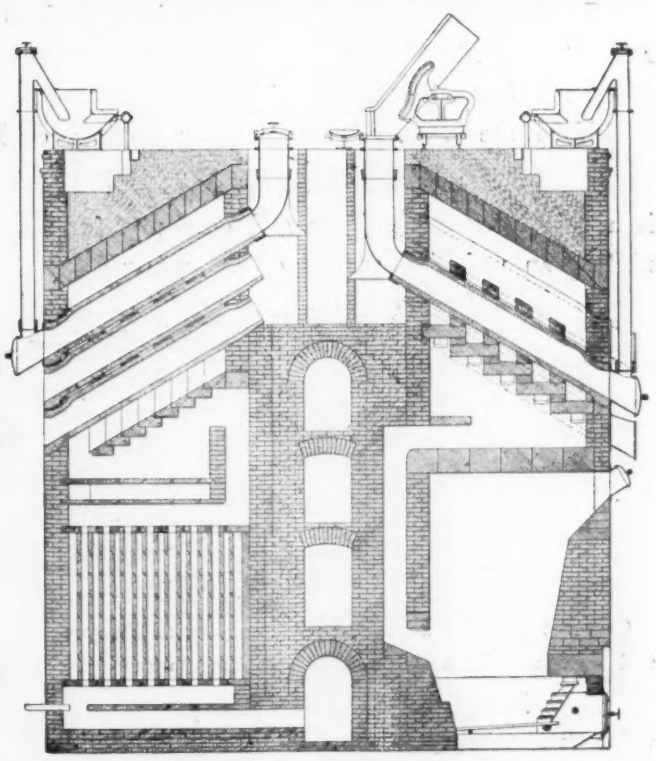

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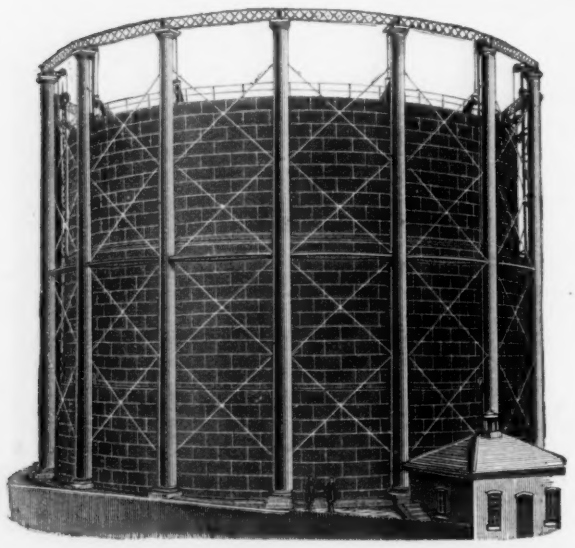

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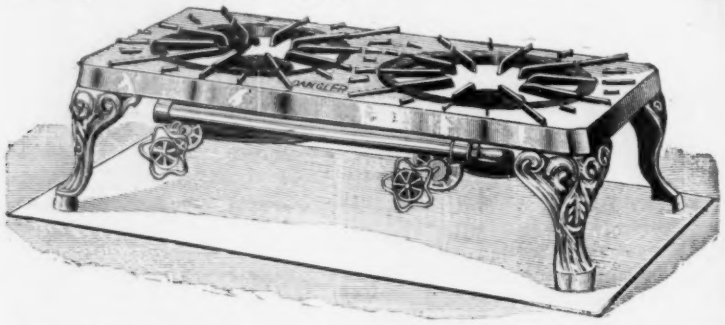

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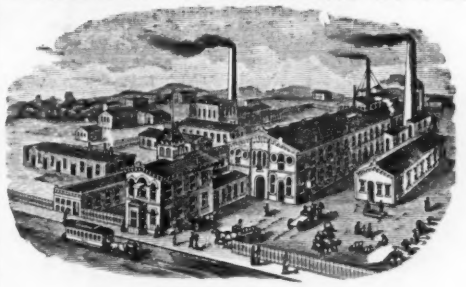

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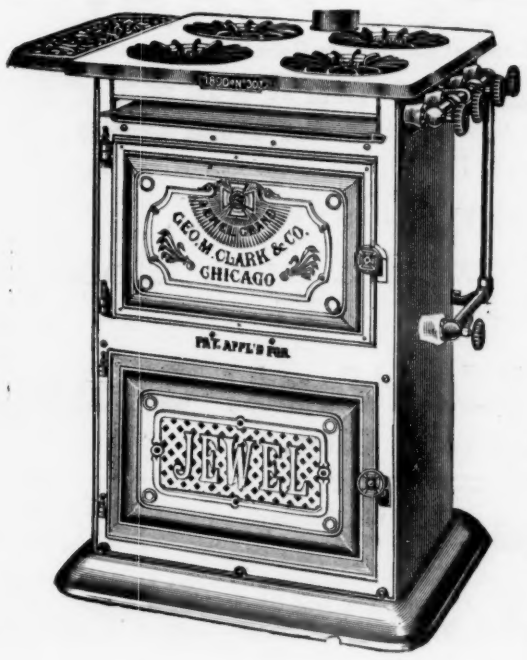

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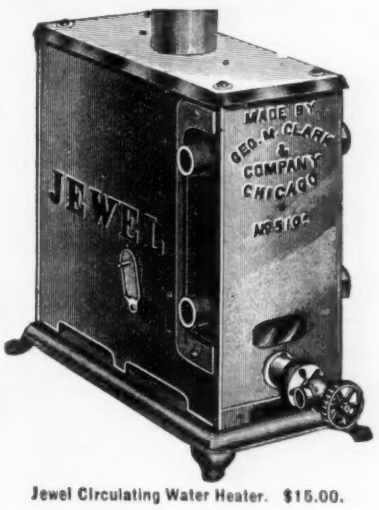

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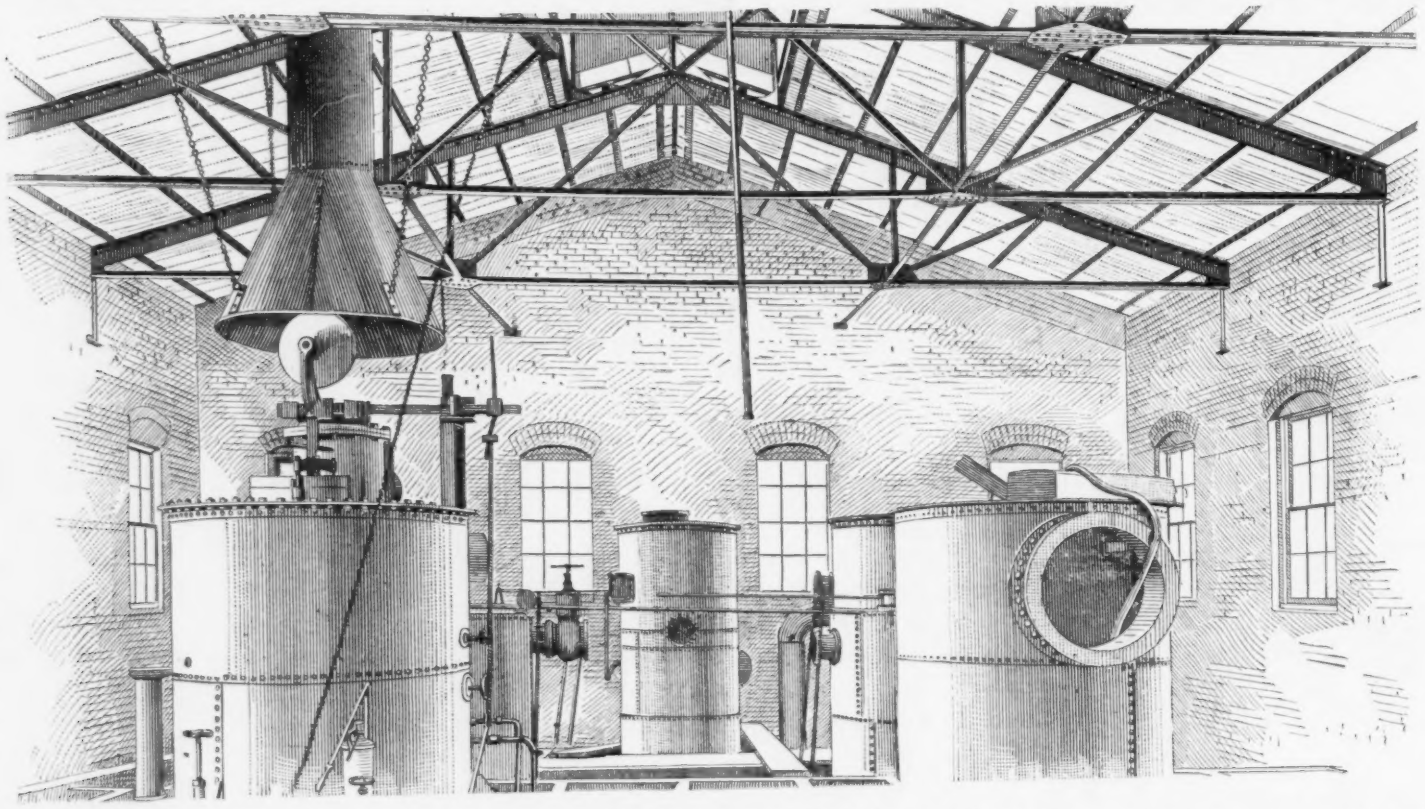

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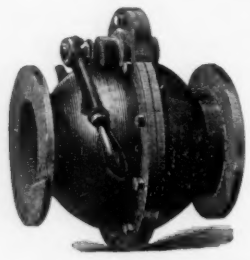

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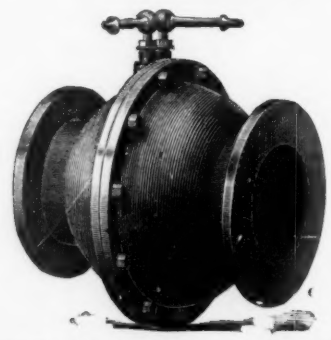

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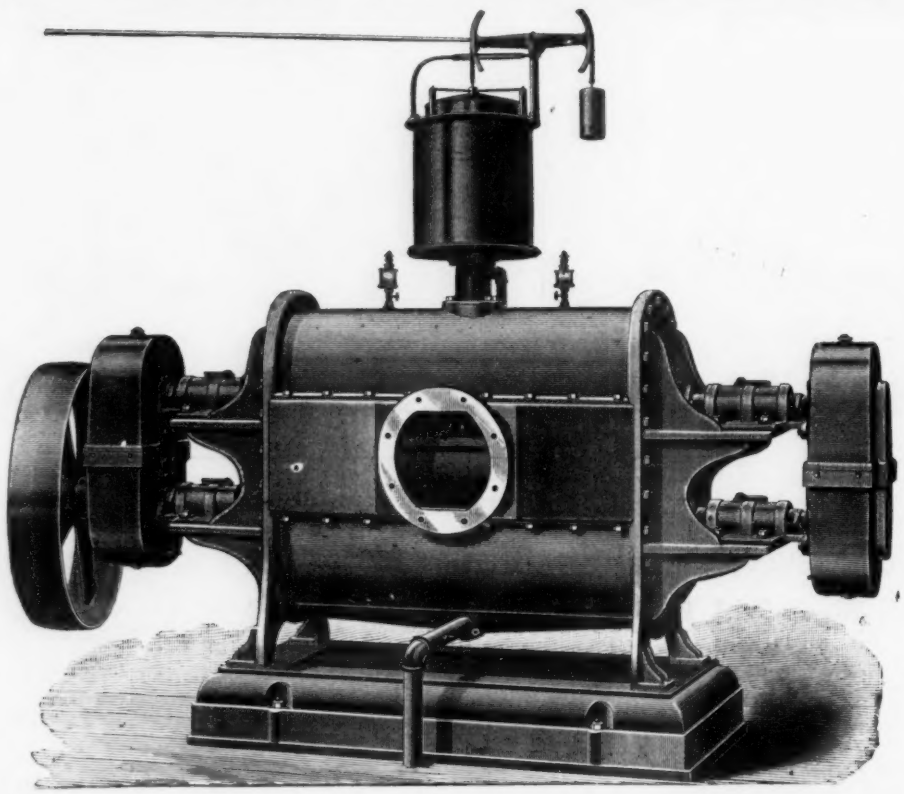

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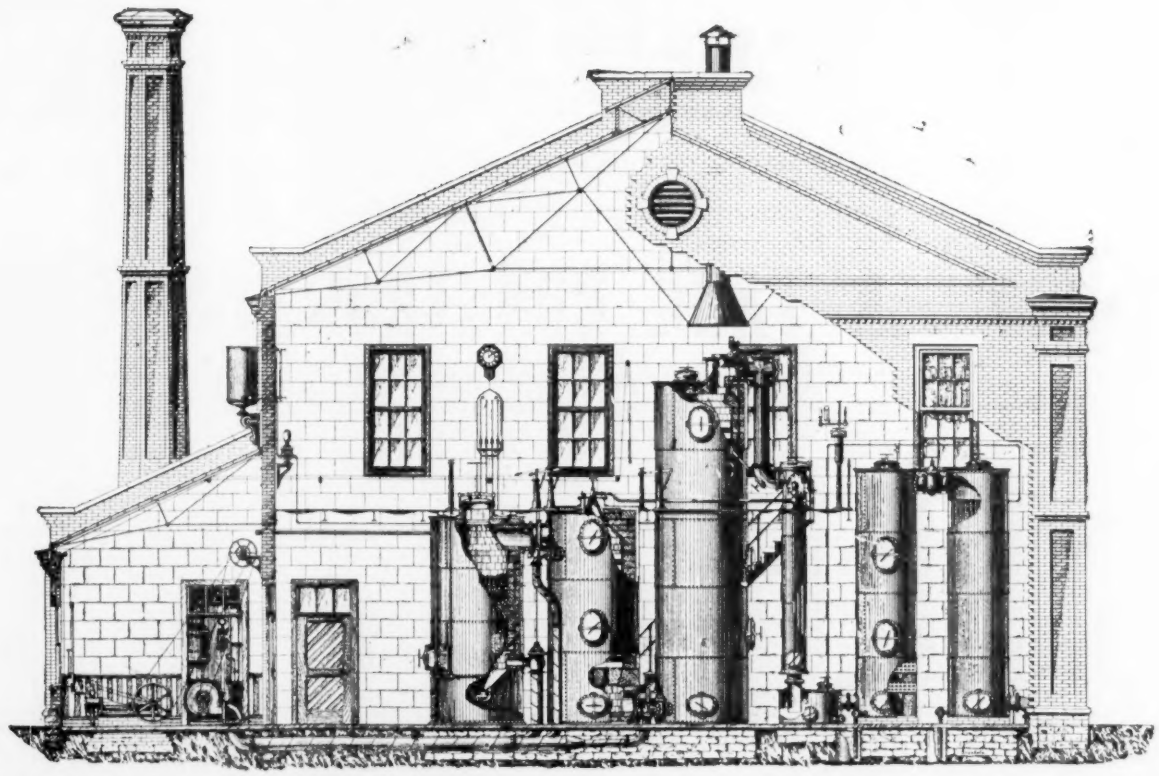

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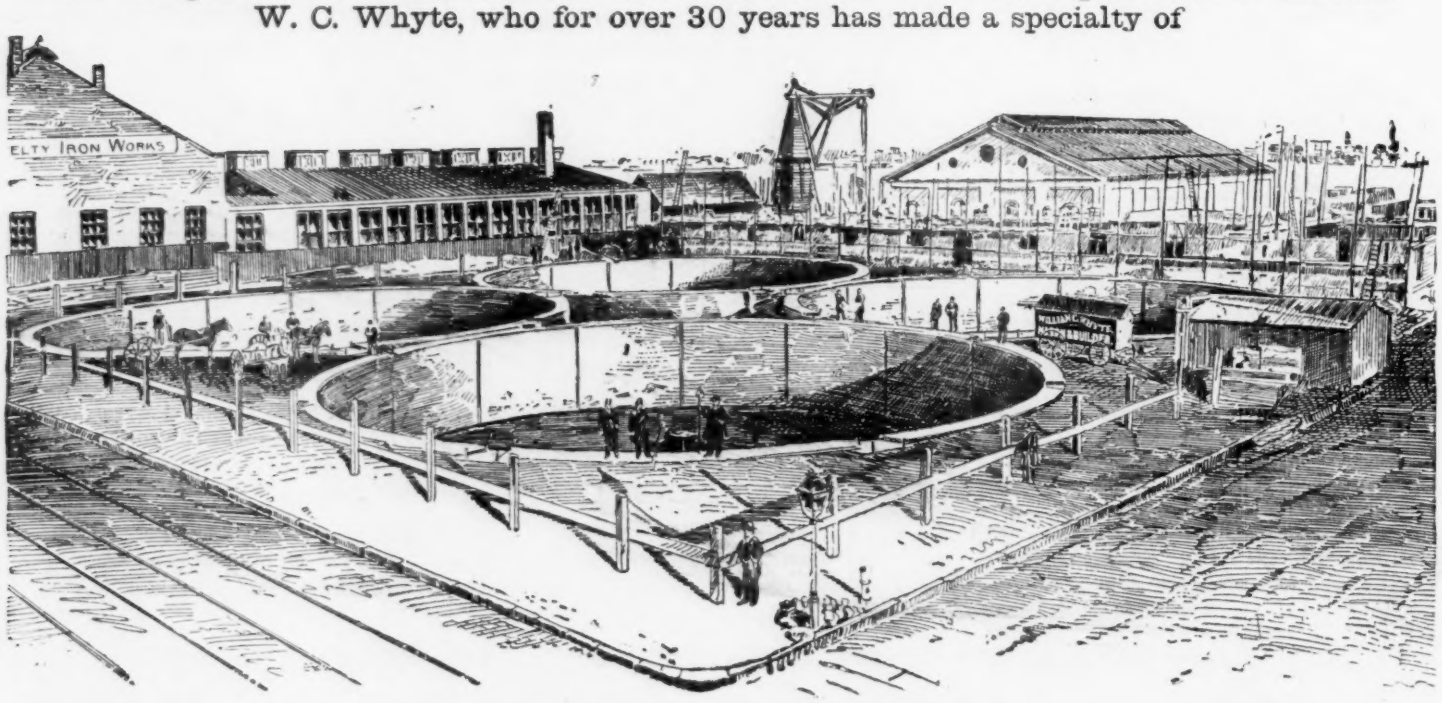

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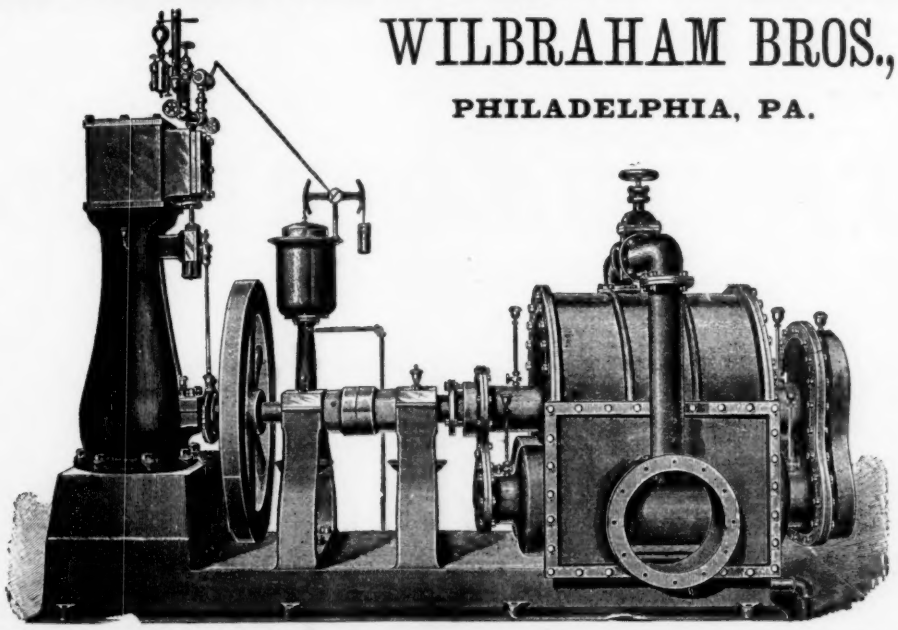

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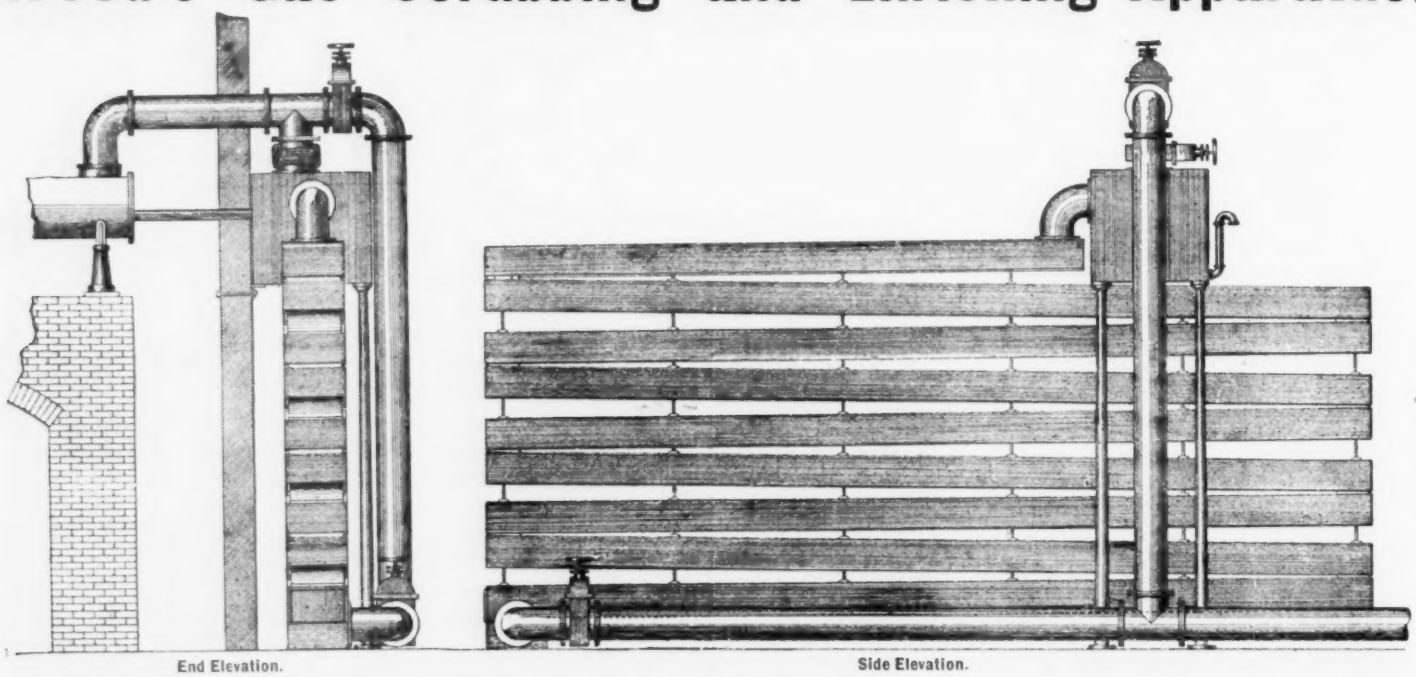

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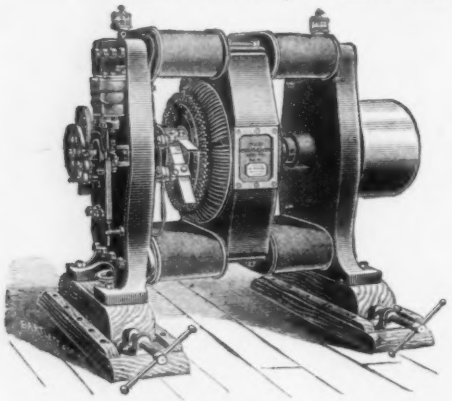

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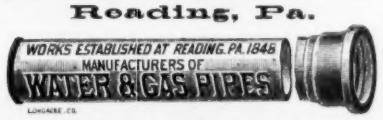

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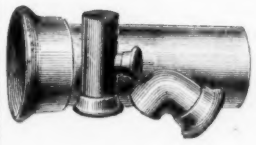

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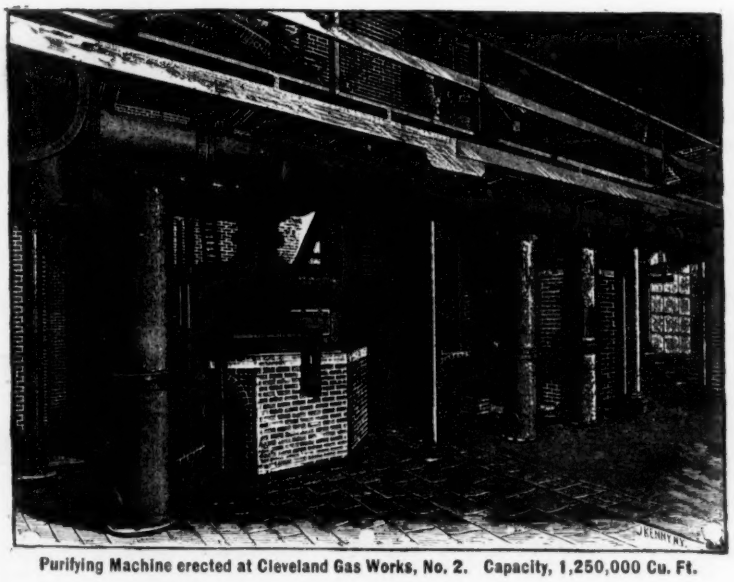

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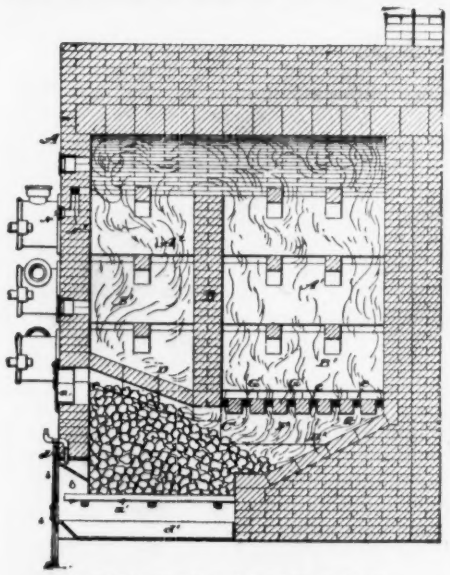

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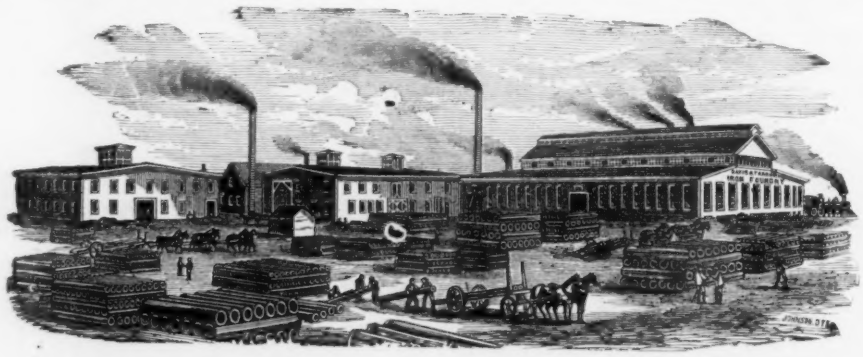

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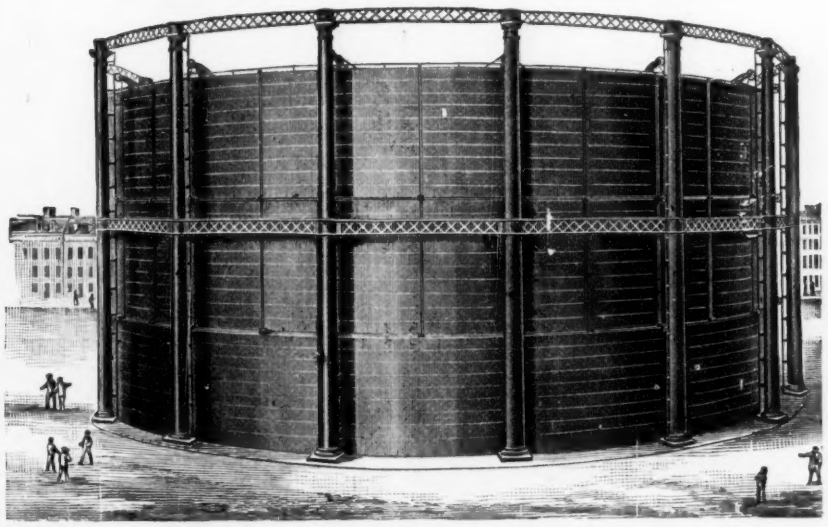

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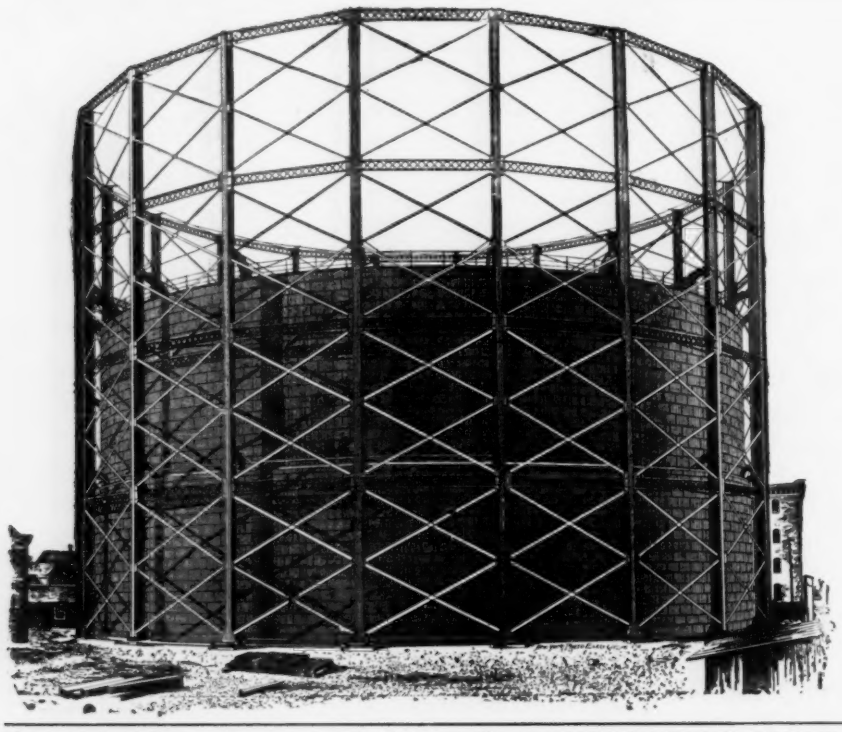

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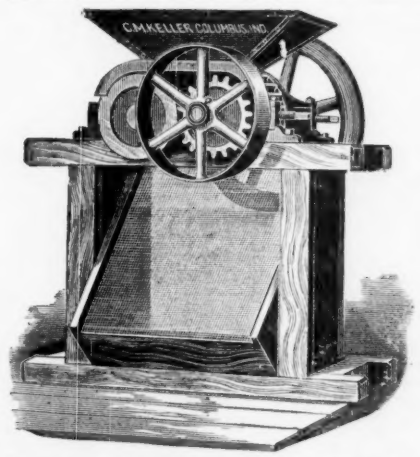

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51 Lancaster St.. Albany, N. Y. 34 & 36 West Monroe St., Chicago, Ill.

STATION METERS, EXPERIMENTAL METERS, METER PROVERS, PRESSURE & VACUUM REGISTERS, PRESSURE GAUGES, ETC.

We use only the very best materials, and employ the most skilled labor, and by our long experience (37 years) and personal supervision of every deta we feel justified in assuring the public that our goods will give perfect satisfaction. Every Meter emanating from our establishment will bear the Sta Inspector's Badge, and will be fully warrented by us. Our Annual and Calendar will be sent to Gas Companies upon application.

Other people have found us,
to their advantage.
We'll be glad to serve you.

STATION METERS.
METER PROVERS.
CONSUMERS' METERS.
REPAIRING METERS.

Exchange for all kinds of Apparatus and Appliances for making Gas. Companies having anything not in use, such as Pumps, Engines, Governors, Purifiers, Exhausters, Scrubbers, Condensers, etc., please notify us and we will endeavor to find a buyer. New Machinery furnished.

GAS PLANTS ERECTED. **Correspondence Solicited.**

KEYSTONE METER CO. - Royersford, Pa.

GAS INTO POWER,

BY THE

OTTO GAS ENGINE.

GAS POWER.—A Source of Revenue to Gas Companies ready to engage in Electric Lighting, building of Water Works, Electric Street Railways, etc.

Coal for producing Gas is less in amount than that for producing Steam, both being measured on an equal amount of work performed. And, further, with Gas,

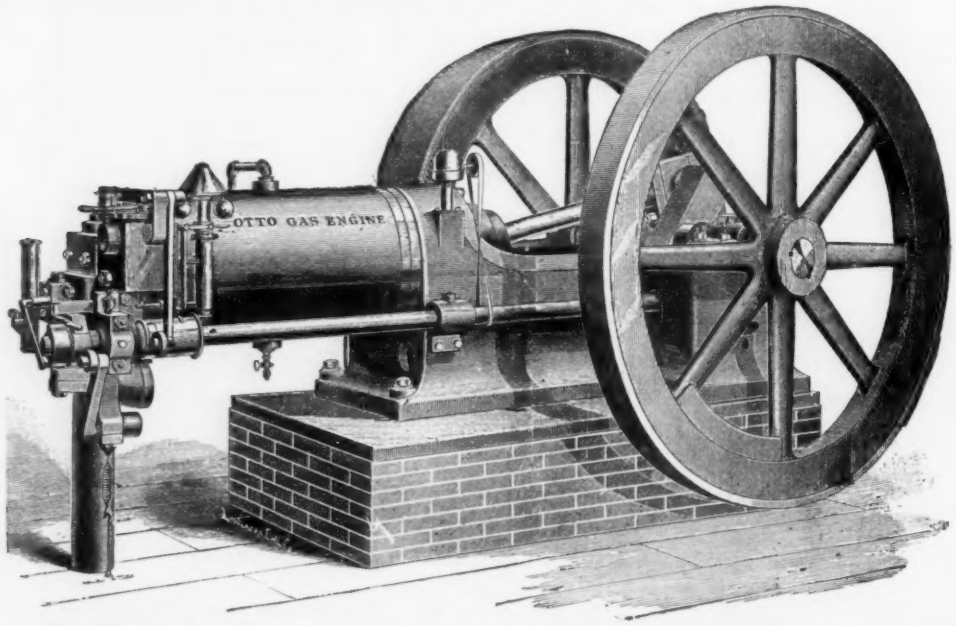
50 to 90 per Cent. of Value of Coal is Returned

by sale of Coke and Tar, according to the market value of these products.

Labor for handling fuel is **reduced,** by its becoming centralized and confined to the gas house and frequently has not increased after the addition of a power station.

With Gas Power, **cost of fuel** is strictly **limited** to the time of use.

MANY VALUABLE AND RECENT IMPROVEMENTS.



SIZES 1-3 to 100 HORSE POWER.

Wherever Gas Companies tried Gas Power with Steam Power together in one Station, the use of Steam was subsequently abandoned or restricted, and Gas Power made to take its place.

Where Gas Companies adopt Gas Power for Electric Plants, Water Works, Sewerage, etc., they not only choose **the most economical power for their use,** but secure to themselves the **numerous advantages of increased production,** without increase of expense, and benefit thereby their entire manufacture. They induce consumers, by their example, to abandon Steam for Gas Power, and, by establishing special rates, make

Gas Power the Leading Power of To-Day,

AND SOLVE AT ONCE THE QUESTION OF FUEL GAS.

"Otto Gas Engine Works,"

SCHLEICHER, SCHUMM & CO.,

151 Monroe St. (Kent Building), Chicago. **33d and Walnut Sts., Phila.**

NEW YORK AGENCY. 18 VESEY STREET.